

The Iron Age

A CHILTON

PUBLICATION

NATIONAL METALWORKING WEEKLY

October 8, 1953

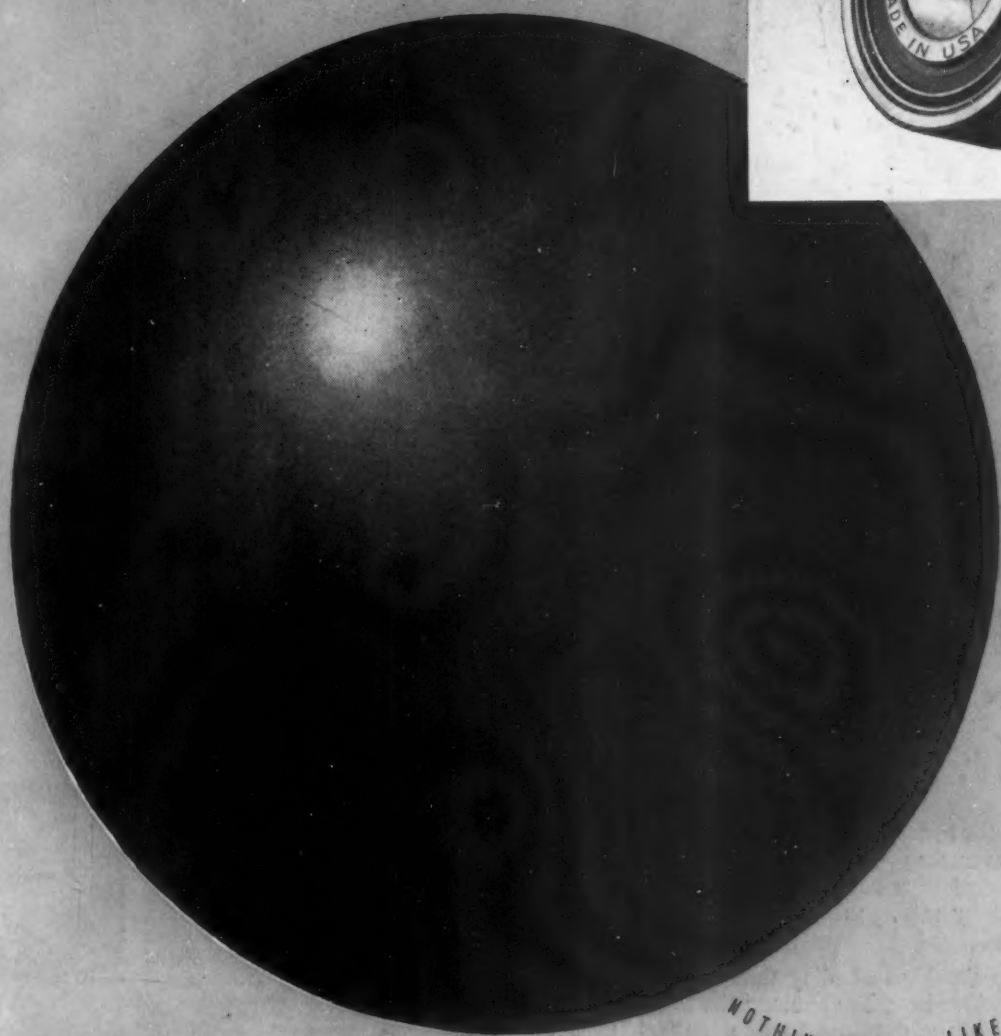
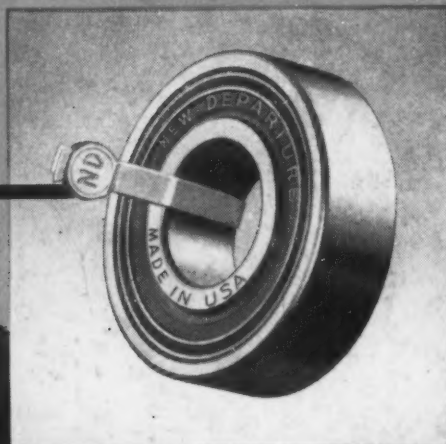
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UNIV. OF MICHIGAN

OCT 9 1953

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OR LONG LIFE — LOW UPKEEP

Since New Departure introduced the Sealed-for-Life ball bearing, more than 255 million have been used in hundreds of applications throughout industry. Reasons for this wide acceptance are many. ND-Seals cut maintenance to the absolute minimum . . . preserve original equipment accuracy . . . make possible more compact design. Perhaps your product could benefit from the use of these efficient bearings. New Departure application engineers will gladly discuss the possibility with you.

NOTHING ROLLS LIKE A BALL



NEW DEPARTURE

BALL BEARINGS

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT
Plants also in Meriden, Connecticut, and Sandusky, Ohio

How many SPARKS in a Spark Plug?

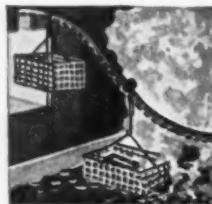


Surprising, the confidence that people have in spark plugs. No one stops to question how many "sparks" they're good for, because long-life performance has come to be taken for granted. Yet, when you get right down to it, you'll find good reasons for this complete consumer confidence. And, from a "sparking" point of view, perhaps the most important is the almost universal use of special Hoskins alloys for the vital electrode wires.

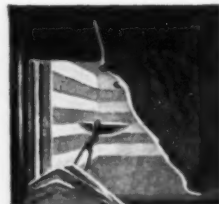
Producing the wire that sparks your car to power is a tough and tricky business. It requires special care in the selection of raw materials. Special melting and production techniques. Plus extremely close control over alloy composition and uniformity of quality throughout the entire manufacturing process.

Yet that's exactly the kind of alloy that Hoskins is qualified to produce best. For, among the other quality-controlled alloys developed and manufac-

tured by Hoskins are: Alloy 717—for facing engine valves; Alloy 785—for brazing belts; Alloy 502—for countless heat resistant mechanical applications. Then, too, there are the Chromel-Alumel thermocouple alloys . . . guaranteed to register true temperature-EMF values within specified close limits. And, of course, Hoskins CHROMEL . . . the *original* nickel-chromium resistance alloy used as heating elements and cold resistors in countless different products.



Hot stuff for hot jobs! Hoskins Alloy 502 is ideally suited to many mechanical-structural applications.



Heating elements made of Hoskins Chromel deliver full-rated power throughout their long and useful life.



Chromel-Alumel thermocouple alloys accurately measure exhaust temperatures of jet aircraft engines.



HOSKINS

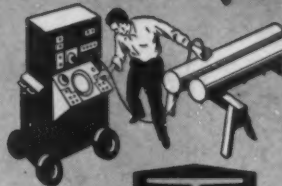
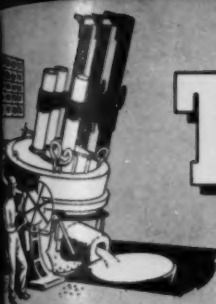
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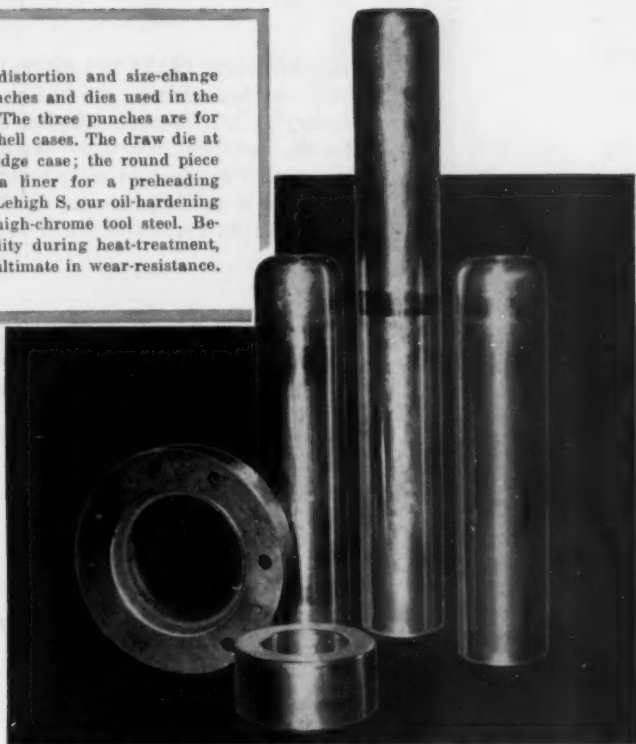
Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

In the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



Only the minimum of distortion and size-change can be tolerated on punches and dies used in the cold-extruding of steel. The three punches are for cold-drawing 105 mm shell cases. The draw die at left is for a 5-in. cartridge case; the round piece in the foreground is a liner for a preheading die. All are made from Lehigh S, our oil-hardening grade of high-carbon, high-chrome tool steel. Besides its inherent stability during heat-treatment, Lehigh S provides the ultimate in wear-resistance.



There's no such thing as a non-deforming tool steel

Shrinkage, growth, and warpage—all occur when a tool is heated for hardening. There just isn't a tool steel which is "non-deforming" in the absolute sense of the term.

It's downright discouraging when an accurately machined tool or die emerges from the heat-treating furnace with its shape distorted or its dimensions way beyond the allowable tolerances. Yet, this experience is quite common.

In many instances the change in size caused by heat-treatment is not so great as to cause any trouble. Proper grinding, to remove scale and to obtain exact tool dimensions, is often all that is necessary. However, excessive warpage or size change can make it costly, even impossible, to restore a tool to the proper shape or correct dimensions, either by grinding or by corrective heat-treatment.

It's obviously important for both tool-makers and heat-treaters to understand the causes of distortion and how it can be controlled within reasonable limits. The design of tools, the grade of tool steel

used, and heat-treatment procedures—all these factors have a bearing on the degree of distortion which will occur.

Warpage, for example, is usually a factor associated with the geometrical shape of a tool and with the thermal stresses produced by lack of uniformity in heating or cooling operations. The composition of a tool steel has very little to do with the occurrence of warpage.

On the other hand, the growth or shrinkage of tools is the result of volume changes caused by the hardening operation. Each grade of steel has certain characteristics of inherent distortion. And it varies considerably with the composition. Carbon tool steel, for example, has a distortion "factor" of approximately .002 to .004 in. on the plus side. A high-carbon, high-chromium grade, such as our Lehigh H, has a factor of only .0005 in., plus or minus.

If you'd like a printed discussion of this subject write to our Publications Dept. at Bethlehem, Pa., for the booklet "Distortion of Tool Steels in Heat Treatment."

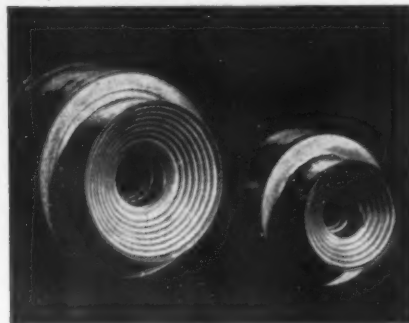
BETHLEHEM TOOL STEEL ENGINEER SAYS:



Avoid drastic changes of section in tool design

You can expect trouble whenever a tool made of a liquid-quenched steel is designed so that heavy and light sections are adjacent. When such a tool is quenched, the light sections cool rapidly and harden before the adjacent heavy sections. Quenching stresses are set up which often exceed the strength of the steel. Cracking is the result.

Although such tools fail during heat-treatment, poor tool design must take the blame. Troubles of this sort are sometimes avoided by differential hardening or making this type of tool as a two-piece assembly. But if a one-piece construction is necessary, then it's best to use an air-hardening steel.



FOR TOOTHPASTE TUBES

These intricately machined dies are used in shaping the tapered neck and tip of toothpaste tubes which are extruded from round slugs of aluminum. When a punch is driven downward towards the die, the aluminum "biscuit" is trapped between the punch tip and the die and is extruded by the heavy pressure, flowing upwards along the cylindrical punch to form the tube body.

The dies pictured are made from our 67 Chisel tool steel, a chrome-tungsten grade of shock-resisting steel that's ideal for tools and dies requiring plenty of impact strength. Although it is principally a shock type of steel, 67 Chisel is readily carburized whenever extra wear-resistance is needed... without sacrificing the advantages of its tough core.

Easy to machine and heat-treat, 67 Chisel is stocked by distributors of Bethlehem tool steel in principal cities.

The Iron Age

Vol. 172, No. 15, October 8, 1953

* Starred items are digested at the right.

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Digest of the Week

NEWS DEVELOPMENTS

INSTRUMENTS SPARK INDUSTRIAL EVOLUTION — P. 207

Sales of instruments are the yardstick measuring industry's climb to more complete automation. The push-button metalworking plant is still in the distance but piece-meal application of instruments to existing plant facilities is guiding industry in that direction. How the trend shapes up.

IRON AGE INTERVIEWS ASM'S R. L. WILSON — P. 210

This week The Iron Age introduces a new feature in which leading men in metalworking are interviewed about timely topics. First crack goes to American Society for Metals president Ralph L. Wilson. His topic is "What's Ahead in Metallurgy." He gives a frank appraisal of past and future progress.

OPEN FIRST SEAMLESS TUBE MILL IN WEST — P. 215

The new Colorado Fuel & Iron Corp. celebrated a noteworthy step in its long-range program of expansion and diversification when it officially opened its new seamless tube mill at Pueblo, Colo. It's a modern mill right in the heart of the oil country market. Capacity is 150,000 tons a year.

INDUSTRY HESITATES IN EXPANSION RACE — P. 219

Office of Defense Mobilization's early '53 estimate that \$18 billion worth of new facilities would go into operation this year now trimmed to \$15 billion. All but 8.9 pct of \$25.8 billion program now under way. Goals under continual review. Any revisions will be selective, won't have big effect on total.

CHEVY AIRS CORVETTE INNARDS, METHODS — P. 224

Corvette conversations invariably split into two sections—one about the car, one about the plastic body's manufacture. This is fitting since the Corvette itself is a duplex probe. With it, Chevrolet is investigating both plastic car mass production and the growing sports car demand.

WAGE-PRICE SPIRAL FAVORS MACHINE USE — P. 235

Figures compiled by Bureau of Labor Statistics show labor cost up 157 pct since 1939 while machinery and equipment prices have gone up only 75 pct. The smaller increase in machine tools makes it advantageous for industry to mechanize. Increases in productivity have eased some of the wage pressure.

MARKETS & PRICES

STEEL WAREHOUSES SALES START CLIMBING—P. 208

Much to the surprise of depression-predictors, warehousemen report heavier sales. Though business from farm equipment and automotive customers is off, air conditioning, stampers, appliances, even garden tractors and lawn mowers are taking considerable tonnage. Inventories are high, product mix improved.

SECRET'S OUT: STEEL COMPETITION IS HERE — P. 213

Sales policy statements by steel producers are a public acknowledgement of a competitive situation that has existed for weeks in some products. Statements came after U. S. Steel announced freight absorption policy within a more competitive market. Outline what's happening, what trend means.

STEEL DELIVERIES TO AUTO FIRMS DIPPING — P. 214

Deliveries of automotive steel are sagging badly and in most cases inventory control is getting the blame. Auto companies, biggest consumers of steel sheets, are having their troubles keeping steel stocks within reasonable limits. Seasonal cutbacks, the GM fire, easing steel market all contribute.

DURABLES TO BEAR BRUNT OF ADJUSTMENT — P. 237

Durable goods manufacturers serving industry and consumer will have a slightly lower resistance to the production ills arising in the incipient adjustment period to a more normal market. Durables did most of the boom climbing, now must do most of the adjusting. But they will keep most of ground gained.

FIRM CUTS BACK ZINC SMELTING 25 PCT — P. 400

American Zinc, Lead & Smelting Co. last week said it is trimming output of slab zinc 25 pct. The move, being made in two steps, will be completed by Nov. 1 and means a reduction of between 1750 and 1800 tons of Prime Western grade zinc monthly. Low price resulting from huge imports is blamed.

SCRAP STEEL PRICE MAY BE AT BOTTOM — P. 404

IRON AGE'S Steel Scrap Price Composite declined only 17¢ this week. It may mean that the downfall of scrap prices has at last been halted. European steel mills are competing on some items with American plants on the East Coast. Detroit inventory juggling has caused a drop in auto steel deliveries.

NATIONAL METAL SHOW

AUTOMATIC PROCESS CONTROL

GAGING AND SORTING—P. 274

Higher costs, greater accuracy further trend to automatic gaging . . . Automatic gages can handle a wide variety of parts . . . Use in machine control.

HEAT TREATING—P. 280

Pyrometers feature more electronic control systems . . . Atmosphere controls save gas, promote safety . . . Radiation units grow with induction heating.

SOLUTION CONTROL—P. 286

Integrated automatic controls are key to low-cost solution handling . . . Better vapor control cuts degreasing costs, reduces health hazards.

MELTING AND ROLLING—P. 288

Automatic reversal pressure control pay . . . Newer pits and controls save 60 pct . . . Direct readers cut analysis time . . . Width gages on wire extruders.

WELDING—P. 294

Voltage controls aid weld uniformity . . . Delay timers eliminate weld-zone contamination . . . Automatic arc starting speeds welding production.

COUNTING AND WEIGHING—P. 298

Preset counters prevent overruns . . . Electronic weighing for heavy-duty jobs . . . Batch counting for carton quantities . . . Photoelectric control.

FOUNDRY—P. 302

Improve castings with air weight control . . . Combine units to get better mixing of foundry sand . . . Heat controls solve maintenance problem.

APC: BRIGHT LIGHT IN INDUSTRY FUTURE—P. 306

New measuring and control systems solve basic industry problems . . . Improve quality, lower costs.

PROGRAM OF NATIONAL METAL SHOW—P. 322

Technical programs of the four participating societies . . . Give subjects, times, dates, places.

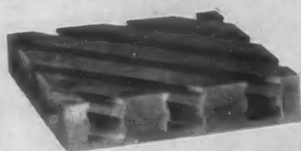
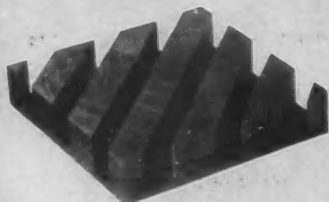
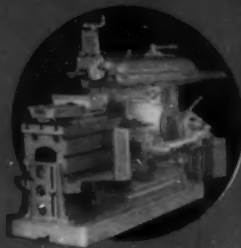
EXHIBITORS IN NATIONAL METAL SHOW—P. 366

List of Metal Show exhibitors classified by products to help you plan your visit.

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Work piece is a malleable iron, Warnock diagonal block. Production, 90 per hour. Special designed gang tool holder carries six form ground high-speed tools.

This production job on a special Cincinnati Shaper is finished in one completely automatic cycle. Both initial cost and tooling costs are low.

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and the Engineering Index.



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Editorial

The Iron Age

FOUNDED 1855

Have You Considered The Handicapped?

AMERICAN industry is to be congratulated for its use of physically handicapped workers. Acceptance of these workers has been widespread. Compared to the attitude 20 years ago it might seem that the millenium had been reached.

But we are a long way from what we could do. There are still many people in high places in industry who are not emotionally mature enough to see the physically handicapped worker as an asset, a morale builder, a happy worker and an appreciative citizen. And right here let's recall that the handicapped person is no more prone than anyone else to self pity, self centeredness or negative thinking.

In these days of shortages of precision workers, tool and die makers, research technicians, machine tenders, secretaries, inspectors, security people and many other vocations it seems ridiculous to pass over the physically handicapped. Most of them can perform such duties with skill and loyalty. But they can't help you or themselves unless they have a chance. They ask to be considered only as any applicant—they want no special consideration.

Let's be specific. Legless workers still have hands, brains and a heart. On many jobs those artificial hands are often as dexterous as normal hands. Blind workers' capabilities are much greater and more valuable than generally supposed. Crippled workers have more shortcuts to getting a job done well than many time study people.

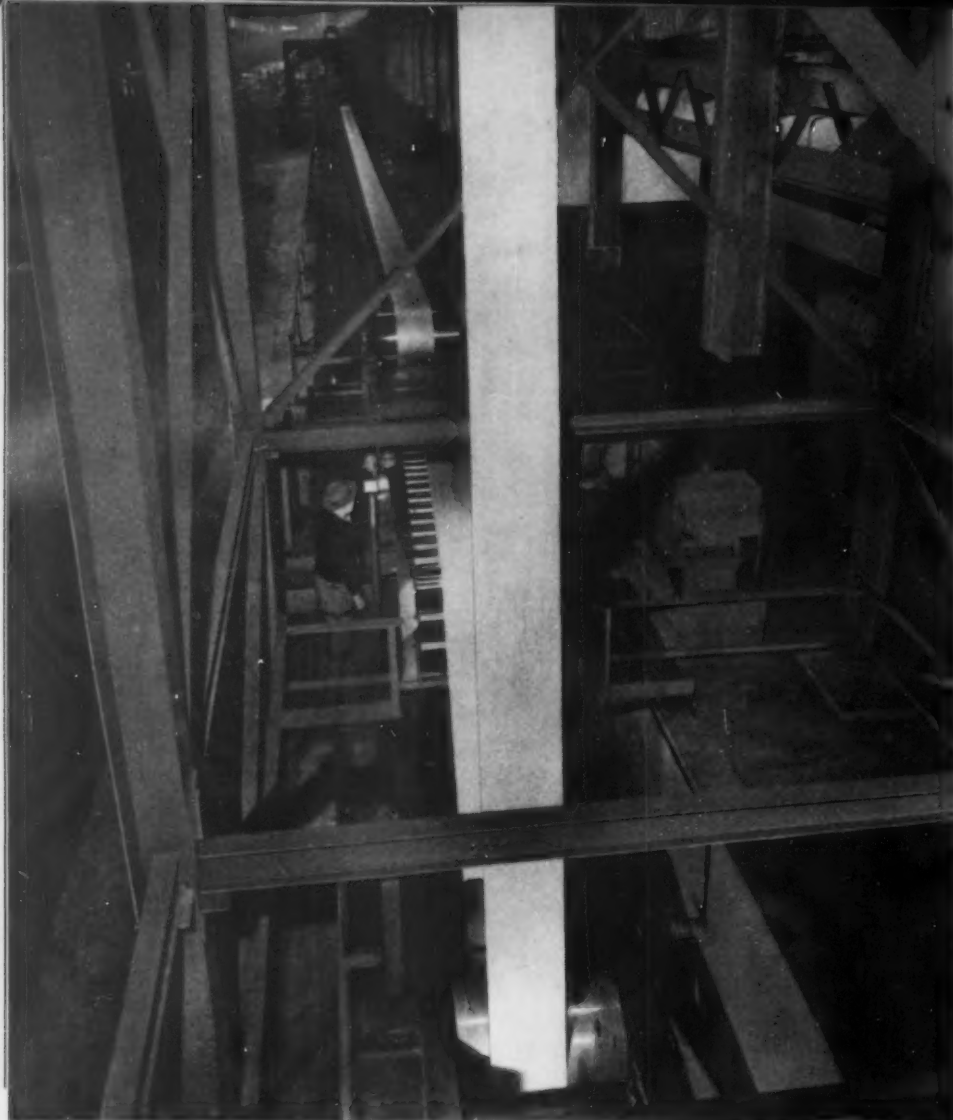
How about the epileptic? How about the heart attack victim? How about other physically handicapped people who also are trying to better their position, reduce anxiety and become well adjusted? With today's medicine, understanding employers and a job under the right conditions these people are an asset of the highest caliber. What about the partially blind worker? Properly placed and trained he makes a loyal and productive worker.

A great and good friend—who himself was catapulted into the handicapped class—says, "Perhaps it may be generally true the handicapped are wiser and in a sense happier than those who are physically normal."

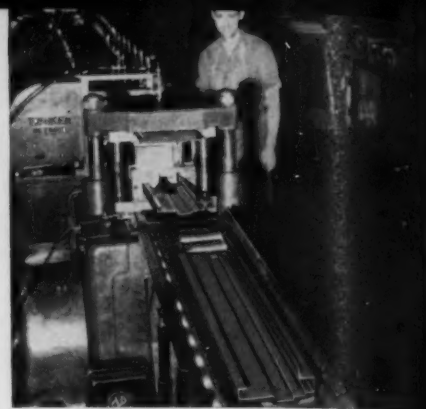
Your President has proclaimed this week "National Employ the Physically Handicapped Week." Meditate on this question in the quietness of your conscience—and your intellect.

Tom Campbell

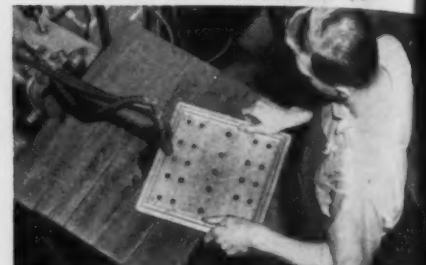
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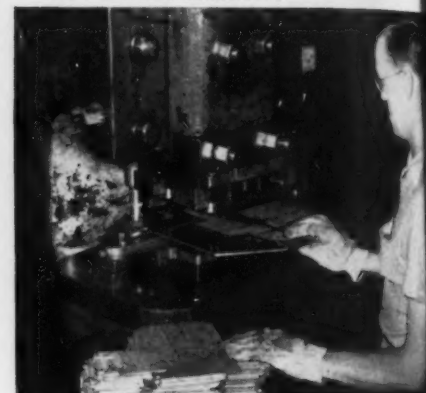
Galvanite* production boosted to aid . . .



Window and door manufacturers . . .



crate and case builders . . .



radio and television makers . . .

Increased use of Galvanite* compels SHARON to up capacity to 50,000 tons a year

The demand for Galvanite* has increased at such a tremendous rate since the close of World War II that expanded facilities at Sharon's Roemer Works for the production of this material were inevitable.

Recently, after many months of design and construction, a special new 50,000 tons per-year line was set into operation, to help satisfy the demand, and to provide better delivery.

New Galvanite Booklet FREE!



A new Galvanite booklet is available to you with information on this popular special coated metal. Write direct or contact the Sharon office nearest you for YOUR copy.

*Trade name copyrighted by the Sharon Steel Corporation

Galvanite* is a special process zinc-coated steel that discourages rust, fights the weather, firmly grips paint. It can be formed, or otherwise fabricated, with all the ease of plain steel.

It has been successfully used as a material for window casements, doors, milk crates, suitcase frames, flexible cable, radiator tubing, roof deck, outlet boxes, etc., and quite recently has boomed as an ideal metal for television and radio.

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SHARON STEEL CORPORATION *Sharon, Pennsylvania*

Dear Editor:

Letters from readers

While You Are Waiting

Sir:

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A. D. LEMONTE
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Surfindicator

Sir:

In reference to the article which appeared on p. 63 of the Aug. 20th issue, we would like to know the name of the manufacturer of the "Surfindicator." We would also like to have any literature that may be available on its use, price and delivery.

W. A. ATLAWES
Supervisor

Modern Tool Works Ltd.
Toronto, Canada

The manufacturer of this portable unit is the Brush Electronics Co., 3405 Perkins Ave., Cleveland 14, Ohio.—Ed.

Glossary of Terms

Sir:

In regard to the "Glossary of Terms Used in Methods, Time Study and Wage Incentives," which appeared in the June 4th and June 11th issues of THE IRON AGE, we should like to translate the whole text into Japanese and publish it in the form of a book to diffuse among the steel industry.

We solicit you for the favor to give us the permission of its transcription.

TAKESHI OKAMURA
Executive Director

The Japan Iron & Steel Federation
Tokyo, Japan

Electric Arcwelding Machine

Sir:

The following article appeared in the Sept. 17th issue under the heading "Newsfront": "Almost ready for marketing is a new type electric arcwelding machine. It's portable and automatic, feeds standard cut electrodes from a hopper. Initial commercial tests in the U. S. and Canada are reported successful."

We feel that the possibilities of this new type electric arcwelding machine would help us in our welding operations and are very interested in as much information that is available on the subject.

F. FEELEY
Manager
Manufacturing Engineering

Dearborn General Mfg.
Ford Motor Co.
Dearborn, Mich.

Further information may be obtained from Elge Associates, an engineering consulting firm, 11 West 42nd St., New York, N. Y.—Ed.

Accurate Polygon

Sir:

We have read with great interest the article, "Angular Standard: National Bureau of Standards Builds Accurate Polygon," starting on p. 207 of your Sept. 10th issue, and we wish to make the following comment:

1. The 24-sided polygon as constructed by the National Bureau of Standards is used primarily with the Watts Microptic Auto-Collimator, a British instrument for determining small angles and changes of angles, direct reading to $\frac{1}{2}$ second of arc (.000002425 in. per in.).

We have received from the National Bureau of Standards detailed information on their polygon used with the Watts Microptic Auto-Collimator.

2. Originally polygons with fixed angles were developed at the National Physical Laboratory, Teddington, England, in many respects the English counterpart of our National Bureau of Standards. The latest polygon developed at NPL is 72-sided. We are supplying polygons of this type with a large range of uses from 5-sided to 24-sided.

E. J. SCHNEIDER
Engle Equipment Co.
Chicago, Ill.

New Resin Linings

Sir:

The Library of this activity would like to procure for the use of the Supply Engineering Division, a reprint or tear sheet of the article "New Resin Linings Give Better Container Protection," June 11th issue, p. 129.

N. G. MONTGOMERY
Librarian
U. S. Naval Supply Research & Development Facility
Naval Supply Depot
Bayonne, N. J.

Silicon Coatings

Sir:

In the April 23rd issue of THE IRON AGE, section titled "Newsfront," p. 73, you mention silicon coatings for protecting titanium. The coatings are said to be applied by a paint and sinter method.

Could you refer me to more information on this coating and its process of application?

R. W. KOCH
Battelle Memorial Institute
Columbus, Ohio

Further information may be obtained at the Ohio State University Library. The title of the book from which the abstract was taken is "Interim Report (On) Study and Research of Siliconizing of Titanium" for the period of July 1, 1952 through Dec. 31, 1952, by Stanley Kluz, Caesar Kalinowski and Ralph Wehrmann.—Ed.



IT
DOESN'T
COST
ONE

Nickel More

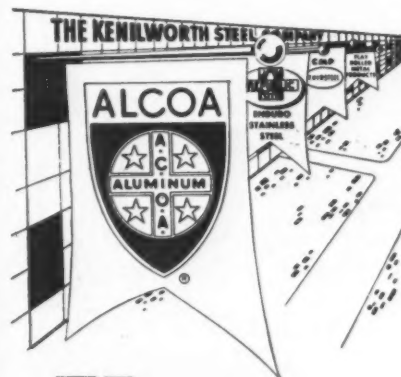
TO
DO BUSINESS
WITH
HELPFUL

KENILWORTH STEEL

and

THESE ARE THE EXTRA
SERVICES KENILWORTH'S
CUSTOMERS ARE RECEIVING

Dependability, convenience, top quality, and fast service are terms or reasons given in many instances to command an extra price. But Kenilworth customers know it's standard equipment here—experience it in order after order. Honestly, we believe you'll enjoy doing business with Kenilworth, too,—besides paying attention to every detail of your orders you'll experience the pleasantries of good business relationship. We can hear you saying it now, "let's give them this tough one for a trial." O. K., we're ready and waiting.



THE **Kenilworth**
Steel Co.

750 BOULEVARD, KENILWORTH, NEW JERSEY
SPECIALISTS IN FLAT ROLLED METAL PRODUCTS
Telephones: N. Y. COntlands 7-2427 • N. J. UNionville 3-6900
Teletype: Roselle, N. J., 367

Which comes first—

COAL or STEEL?



● We give up . . . Without coal, the vital steel industry of today could not exist. Without steel, the enormous tonnage of coal needed by the steel industry could not be produced or delivered. Here is another example of the interdependence of two basic industries!

We can report *this*, however: The mines in Baltimore & Ohio territory are prepared and equipped to go right along with the steel industry in its expansion program. Too, there are millions of tons of untapped reserves of coking coals available for development.

These coals are available in varieties for all coking needs. They are easily accessible, and in plentiful supply for long-range planning. Whatever your requirements, let us advise you. Just ask our man!



**BITUMINOUS COALS
FOR EVERY PURPOSE**



BALTIMORE & OHIO RAILROAD

Constantly doing things — better!

Fatigue Cracks

by William M. Coffey

Inside The Iron Age (IX)

Tom Rohan, our inexhaustible West Coast man, who many times generously sends us bits of bits to print here, gives us an insight into the daily life of an IRON AGE reporter. Tom writes:

So when did we go into the shoe business, I want to know?

Last week I went sashaying over to Rheem Mfg. Company at San Pablo, California, for a story on a new type of forged dies used in 155 mm. shell making. So I tell the first engineer I meet that I'm from The Iron Age.

"You've got the best darn shoes in the business," sez he. "I wear them myself."

"Not shoes. Magazines," sez I, launching into the text from Brochure No. 83 that tells how The Iron Age is the most powerful industrial magazine in the world.

"Yes, I know," sez he. "But you're in the shoe business, too, aren't you?"

So we knock this around awhile and finally he takes me to the Safety Dept. and, sure enough, there's a whole store room full of Iron Age shoes. It develops these are steel-toed safety shoes. They're very popular with workers and office men who have to dash into the shop and don't want to come back minus a toe. Also highly recommended for dancing teachers.

The whole deal reminded me of a junket last year through the California central valley. Together with a bunch of reporters we travelled from town to town and visited plants. Of course, we met a lot of farmers who, invariably welcomed me warmly when they heard the name Iron Age.

After two days of this I finally button-holed one of the farmers and said, "Look, I know The Iron Age is a famous magazine. But there's not much in it for farmers. How come all the farmers read it?"

"Magazines! Heck no. It's the best potato planter in the world. Use it myself," sez he in a familiar routine.

Fermez La Fenetre—

Maupassant

We sit at a desk in a glass enclosed office which looks out on the entire circulation department filled with bright, beautiful girls. One glass partition, however, has been taken out so that when we holler for something we get results instead of vacant stares.

Was sitting at this desk the other day very hard at work, of course, when we heard a strange rustling sound coming from behind our chair. Didn't pay much attention to it because aforementioned girls are in the habit of throwing things at us through this open partition. Just figured one of the girls had thrown and missed.

But it happened again—a peculiar flapping noise. So we turned around and, you'll never guess, as they say, there was a real live New York City pigeon that had come

in through the open window. Well, you know what broke loose. That pigeon, big as a turkey it seemed and scared to death, lit out and flew frantically this way and that all around the office looking for a way to haul out of there. Made this entire 5th floor resemble the Cleveland Air Races until some sterling character, braver than the rest of us, finally captured him and threw him back.

Sorry he got away so quickly. He may have been carrying a subscription order. The mails aren't what they used to be, ya' know. Keep sending the money.

Gardex Le Photo—

Sullivan

Managing Editor George Sullivan tells us that the photo-taking business isn't confined to baby pictures. About once a year he gets a phone call from an alert reader who has been approached by a photographer, announcing that he's doing a story for IRON AGE. He wants to photograph the plant, the company president and all that. Sometimes he's successful and winds up sending us the photos and a write-up.

Last week one of these chaps approached a plant in Boston. A very alert fellow there called up George and said the photographer had nothing in writing from THE IRON AGE, no form of credentials of any kind or permission from the company itself. Naturally the photographer got the boot. George just wants everybody to know that you should do the same thing. Check with us. Allowing the pictures to be taken or giving a story probably won't get you in a jam or cost you money, but there's not much chance of the interview or pictures ever seeing print in your ffj. My name's Friday. I'm a cop.

Puzzlers

The answer to the puzzler about the brothers and sisters, the father and the man is: The father is speaking to his son. *Winners:* J. J. Brugman, W. B. Lobbenberg, A. J. Reardon, J. P. Barnum and Mr. Rice.

New Puzzler

Eustace, Angus and Bertram are flipping coins for gain. Eustace's coin—a 5¢ piece—lands heads-up. Angus's—a two-bit piece—lands tails-up. What are the odds against Bertram's losing?

now you can
produce
trouble-free,

FREE-
MACHINING
STEEL
with
FOOTE
MANGANESE
SULPHIDE

This fume-free ladle additive increases quality and reduces the cost of producing high sulphur, free-machining steels . . . with these plus advantages:

1. improved hot rolling behavior
2. fewer surface defects
3. fewer diversions
4. lower conditioning costs
5. low carbon content saves heat time

TYPICAL ANALYSIS

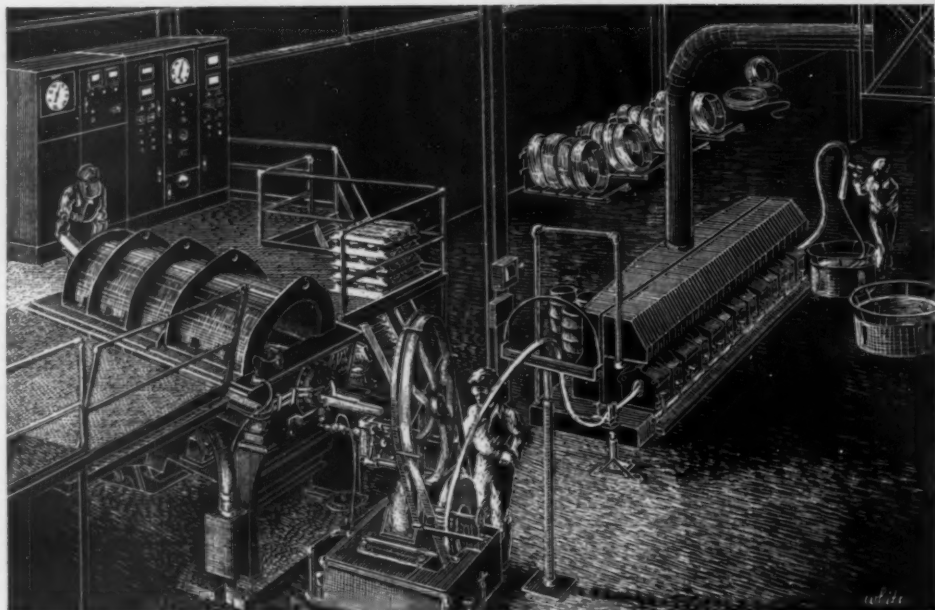
Manganese	53%
Sulphur	32%
Carbon	.22%
Size: 1" x 5" lump	

write for further details!

Foot
MINERAL COMPANY

438 Eighteen W. Cheltenham Bldg.
Philadelphia 44, Pa.

From Molten Aluminum to $\frac{3}{8}$ " Diameter Rod in $1\frac{1}{2}$ Minutes!



Rome Cable Corporation

uses

AJAX INDUCTION FURNACES

for

MELTING ALUMINUM FOR CONTINUOUS CASTING AND ROLLING OF HIGH CONDUCTIVITY ROD

The picture above, a drawing made at the Rome Cable Corporation, Rome, N. Y., shows one of the most modern installations in the country for the continuous casting and rolling of aluminum rod. From left to right are shown the electric controls of the adjacent 450 kw. AJAX low frequency induction combined melting and holding furnace which is pouring molten metal into the Properzi continuous casting machine in the foreground, and the rolling mill from which the coiled rod is emerging.

This installation casts at the rate of about one ton per

hour. The furnace feeds a continuous stream of molten aluminum at automatically controlled temperature into a rim cavity on the slowly revolving wheel of the Properzi machine. Metal loss from pig to rod averages less than 1 pct. Mechanical properties and electrical conductivity are excellent; the material is sound and fine grained. The men work under cooler, cleaner conditions because the only heat generated is within the melt itself. Due to melting conditions inherent in AJAX furnaces, the operation is continuous and no fluxing is required.

VISIT THE AJAX BOOTH, NO. 221, AT THE METAL SHOW

AJAX

TAMA-WYATT



AJAX ENGINEERING CORP., TRENTON 7, N. J.

INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Mulliken Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

THE IRON AGE Newsfront

ALUMINUM IS PREPARED FOR SOLDERING through use of ultrasonic vibrations in a recently tried British method. Vibrations break up the oxide coating, prepare the surface for bonding. Method is used to prepare small cracks and holes in the surface of aluminum castings.

AUTOMOBILE HORSEPOWER RACE will probably continue at least into the 1955 models. Known plans of car makers indicate there will be a sharp stepup in horsepower, including low price cars.

SMOOTH SURFACES OF UNIFORM THICKNESS are now obtainable on dip-painted parts by a method of detearing. First, excess paint is allowed to drip off the part. Then the part enters an electrostatic field which removes remaining tears of paint, leaving a uniform coating.

NICKEL PLATING DEPOSITS WITH CONTROLLABLE STRESS AND HARDNESS are believed possible with a process involving the sulfamate nickel-type bath. The process, successful in a test application in the printing industry, is believed to hold advantages for other applications.

PIONEER WORK BY THE AUTO INDUSTRY ON PLASTIC CARS indicates a satisfactory finish is difficult to obtain by mixing paint or pigment with the plastic itself. To get the luster customary on auto finish, it will probably still be necessary to spray on paint.

CAST REFRACTORIES FOR HEAT TREATING FURNACES have more than lived up to expectations in cutting furnace construction costs. One company tried the method on a 23-ft furnace. Complete job required less than 480 hours. Furnace operation was improved.

TOOL AND DIEMAKERS, now planning an active promotion of their industry as the key to mass production, are going all out to attract apprentices. Even the smallest shops hope to be able to set up progressive training programs to insure a ready supply of capable bench men.

TV CAMERAS FOR INDUSTRIAL USE are attracting much interest, but potential users aren't sure how to apply them. Installations have been made but most people just do not know how they can employ the unit in their plant. Needed: Some idea men.

A FULLY AUTOMATED liquids processing plant is in the talking stage, and may be built next year. Present plans call for a computer brain. Tell it what you want, then turn over the entire plant to the computer and it turns out the product as directed until you signal a change.

LEGISLATION TO CLARIFY legality of freight absorption is in greater need than ever now. Question may have been academic during time of shortage. But not now. Federal Trade Commission rulings do not set forth affirmatively what practices may be followed. Result: Absorption is either (1) strictly on an individual basis, or (2) at your own risk.

October 8, 1953

MELTRITE

PIG IRON

Demand Reflects Value



Making MELTRITE
Pouring molten iron into
moulds at the pig machines.

MORE USED THAN ANY OTHER MERCHANT PIG IRON

70 years of
service
to industry

PICKANDS MATHER & COMPANY

UNION COMMERCE BUILDING • CLEVELAND 14, OHIO

CHICAGO • CINCINNATI • DETROIT • DULUTH • ERIE • GRAND RAPIDS
GREENSBORO • INDIANAPOLIS • MINNEAPOLIS • ST. LOUIS • WASHINGTON

IRON ORE • PIG IRON • COAL • COKE



INSTRUMENTS: Spark Industrial Evolution

Sales are yardstick for measuring automation progress . . . How field has spurred . . . Who has benefited . . . How trends shape up . . . Metalworking moving in—By K. W. Bennett.

Instrumentation is causing an industrial evolution. Sales of instruments are the yardstick measuring industry's climb to more complete automation. For metalworking, the fabulous push-button factory is still in the distance but the piece-meal application of instruments to existing plant facilities is guiding industry in that direction.

In the Twenties, instrumentation stirred. World War II roused it completely. Despite a falter now and then (*THE IRON AGE*, June 11, 1953), instrument sales continue edging upwards. Mechanical measuring instruments have spurred 628 pct since 1939. Electrical measuring instruments have risen 455 pct and scientific instruments, the most impressive gainer, have jumped 655 pct from their 1939 levels.

Chunk of Plant Dollar

In the past 15 years, spending on instruments has expanded twice as fast as other capital investment. An estimated five pct of the nation's plants were involved in instrumentation programs in 1939. Instrument makers estimate that from 10 to 20 pct of plants are today involved in various kinds of instrumentation projects.

Instrument producers calculate that in 1939 from one to three pct of the new capital equipment dollar went into instruments. Today, this figure has risen to seven to eight pct and the field hopes for 10 pct in the near years, 15 pct in the long-term future. There is optimistic belief that by 1955 overall instruments output should be double that of 1950.

In 1945, when the B-17 was still a heavy bomber, 15 pct of its total cost went into instrumentation and

automatic controls. For modern aircraft, instrumentation costs are 50 pct, for guided missiles now on the drawing boards, 90 pct.

No matter how many statistics you pull from the lower desk drawer, it is difficult to predict the full potential of the instrumentation industry. Research is producing new instruments, new adaptations of existing instruments, and new combinations of old instruments.

Of the 220 exhibitors at the recent National Instrument Conference at Chicago, 150 showed new

product lines or newly designed equipment. Research programs have been outstanding. Last year the national average for research expenditures was two pct of the sales dollar. Instrument builders were spending an average 6 pct.

Who buys it all? For the small plant, big-scale instrumentation seems a long way off. First to profit, mainly because of the liquid nature of their products, have been oil and chemicals. It's simpler to produce a machine that will turn valves on and off than to automate heavier, more complicated metalworking processes.

As instrumentation, and consequently automation, is applied to production, alarmists predict a wasteland of unemployment and an effete civilization. But increased productivity, efficiency have never never retarded progress. Instead they contribute to an ever-expanding economy, utilizing more and more workers. Instrumentation will be gradual and thus won't be a dislocating force. New processes will bring out new products, create jobs.

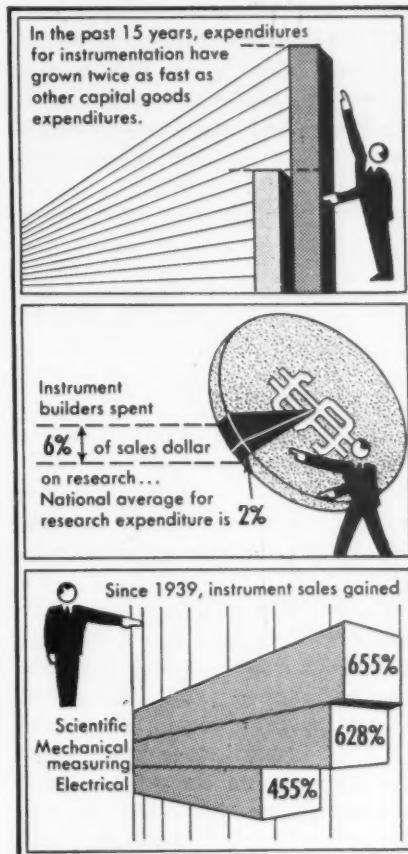
Despite instrument makers' full-throttle development work, they'll have to work even harder to keep up with industry's demands for newer types of instrumentation. Instrument salesmen often admit they don't know what happens to some of the equipment they sell.

The plant engineer sometimes hooks together components obtained from four or five different instrument companies, produces a specialized device for his plant alone. Much of the advancement in plant automation will be developed by the plant's own engineers.

Automation must be elastic. A giant machine that produces one type of television circuit could soon become obsolete if it couldn't be modified to produce new types of circuits.

With its market scarcely pene-

Instrument Use Grows Fast



WAREHOUSES: Steel Sales Start Up

Predict 1953 sales will top 1952 by 10 to 15 pct . . . Inventories are climbing . . . Product mix is better . . . Business improving but more competitive—By K. W. Bennett.

Steel warehousemen are wearing smiles. They predict total 1953 business will top 1952 by about 10 to 15 pct. And in some cases it will surpass all-time record levels of 1951.

One reason for boom sales: With 1953's continuing improvement in steel supply, warehouses have more steel to sell. They also balance inventories so that they have a wide variety of shapes and sizes for fast delivery.

Beginning the year at 60 pct of normal, overall inventories on the nation's warehouse floors were up to 90 pct last week. This is based on a year when stocks were fairly high and it means that inventories are now at their highest point since the beginning of 1951.

Sales Already Climb

Product mix is also achieving fairly good balance. With the exception of wide flange beams and other heavy structurals, warehouses are able to offer good variety of sizes, shapes and analyses.

Sales started upward last month

after a comparatively dull summer. Consumers who buy from warehouses are returning to the old seasonal buying pattern. Business will be heaviest in the early spring and the fall.

Here's another possible factor: The big inventory cleanup by industry began in June. It's still continuing. But the firms that started early finished early. Now, with better adjusted inventories, they're beginning to shop for steel again.

To depression-predictors, the upswing in warehouse sales seems an impossibility. They point out that farm equipment and automotive buying have been dropping. Minneapolis, scene of a chapter meeting of the American Steel Warehouse Assn. last week, is a case in point. The area is tied traditionally to the farm market, yet local steel warehousemen indicate business is good and on the upswing in recent weeks.

Though sales to the farm market are off, air conditioning, stampers, appliances and even items like garden tractors and lawnmowers are

taking considerable tonnages. So is the mining country to the north. The same is true in the Chicago area.

Warehouse business levels are high. But selling is competitive. Warehouses are boosting sales training budgets, are demanding tight and tough inventory control, are pushing for fast turnover of as much as three times a year.

Premiums for salesmen are back. As one sales executive put it, "Where it took two phone calls to sell a ton of steel last year, it now takes six. But we're still selling."

Some Structurals Scarce

West and East Coast inventories are fairly good, probably better than those in the Midwest. Plate, tight for the past 2 years, appears in fair supply. Strip and coil are in relatively good shape and even cold-rolled sheets have been easing swiftly. It has been predicted that most items will be in good supply by the end of October.

Wide flange structurals are still the supply bugaboo. One purchaser at Chicago, after canvassing ten local warehouses unsuccessfully, began looking for foreign suppliers. Since warehousemen believe wide flange use is up relatively more than other structural types, they don't look for any increase in their stocks of this item this year.

Special Report

Continued

trated and a replacement business growing, the instrument field is counting on a good measure of success. Industry's growing absorption in cost-cutting methods assures this.

While oil and chemicals have gotten in on the ground floor, other processing industries are moving in rapidly, including petrochemicals, plastics, basic steel, pulp and paper, textiles, food processing, and even macadam for road surfacing.

Now, metalworking is shaking off inertia and moving swiftly into the field. Steel mills use television cameras for quality control, beta gages, telemetering for compressed gas requirements. One mill will apply instruments to its reheating furnaces.

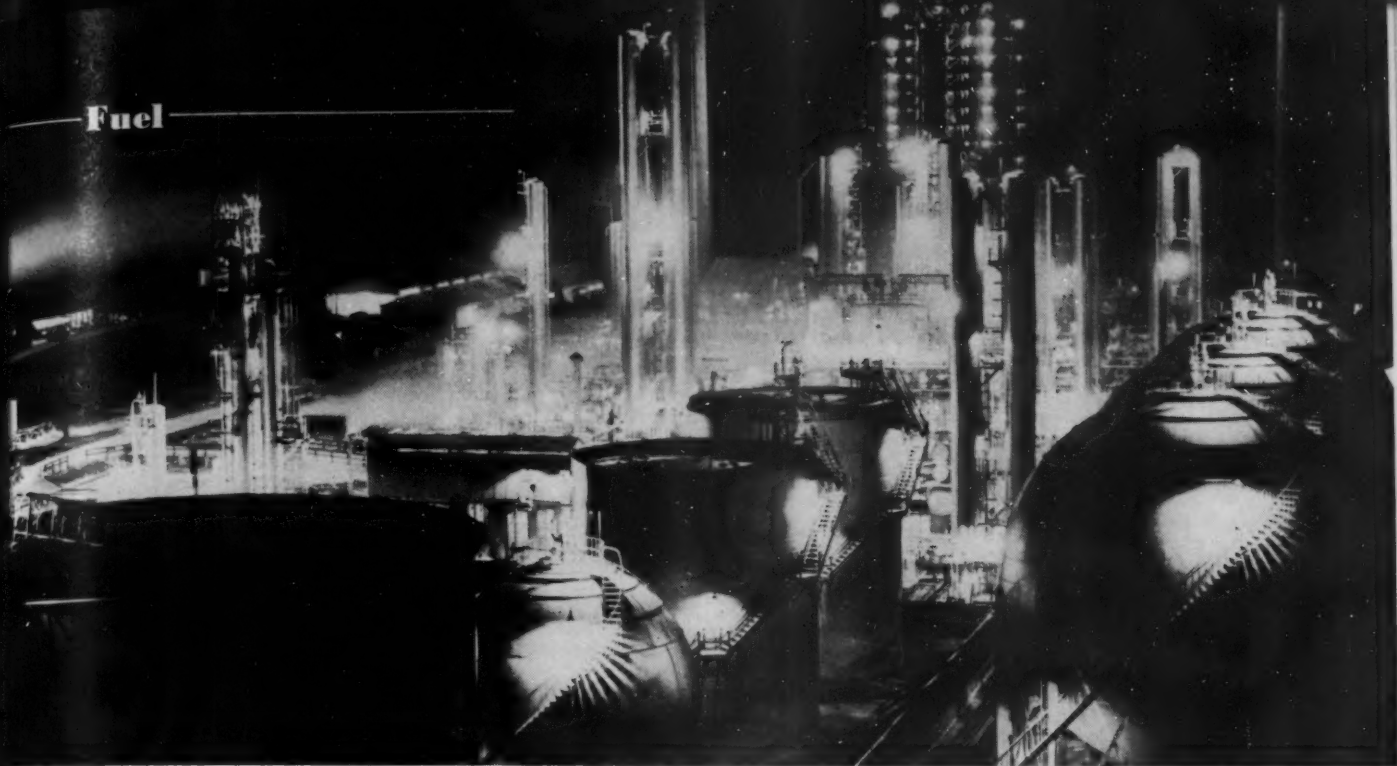
Gas input will be adjusted to the existing heat in a slab that is to be heated for rerolling. A hot slab fresh from the slab mill will require less gas than a slab that has been yard stored. Industrial furnaces that will adjust the speed of travel automatically to the temperature required in the object passing through the furnace are already in use.

The old household thermostat has been revved up, and a new adaptation measuring temperatures outside the building is available. Builders are convinced it will become established firmly in the home market, even though the conventional unit costs from \$12 to \$15 and the new unit will retail at \$75 to \$100.

Another innovation is heat control by individual rooms, an application already popular with builders of specialized machine tools working with tolerances so high that a constant temperature is necessary in at least limited areas of the plant.

Another firm is automating a stamping and flash-removing operation.

Even mechanical brains are finding a home in the industrial plant. The electronic computer can analyze manufacturing processes by receiving impulses from machinery. Noting a deviation, the computer would adjust the speed of individual machines to keep production flowing at optimum.



OIL: West Coast Gets Canadian Gusher

Edmonton pipeline brings oil to Pacific Northwest . . . New market for steel, new oil supply . . . Sparks refinery building activity . . . Competition shapes up—By T. M. Rohan.

Oil started gushing this week through a 715-mile pipeline from the rich Edmonton, Alta., fields in Canada to the Pacific Northwest. Threaded through some of the roughest terrain ever encountered by pipeline crews, the pipeline simultaneously opens up a large new market for steel and a new oil supply. (A full progress report on the pipeline was first given in *THE IRON AGE*, Sept. 18, 1952).

Already the new 24-in., \$90 million pipeline started last year has taken substantial tonnages of steel—151,000 tons of 24-in. welded pipe, 80 pct of it from Kaiser-Basalt and Consolidated Western Div. of U. S. Steel Corp.

\$40 Million for Steel

How much more steel will be needed to supplement the pipeline? New and expanded refinery capacity to process about 113,000 bbl of crude oil a day from Edmonton must be built. According to Standard Oil of California's rule of the thumb, straight refinery capacity for a barrel of oil requires a ton of steel.

For Consolidated Western and Kaiser, transmission pipe represents an annual market of about 350,000 tons. Of this, Standard Oil of California purchases 60 pct at an annual cost of about \$40 million. For pipe, tubing and casing alone almost \$5 million is spent annually.

The new pipeline built by Transmountain Pipe Line Co., a subsidiary of Bechtel Engineering of San Francisco, and several major oil firms was initially rated 75,000 bbl per day but will hit 150,000 next year and 300,000 by 1955 through addition of pumping stations.

Bechtel's construction costs averaged about \$24 per ft, including stations, tank farms, etc. In a few minor instances it reached \$1000 per ft over rugged country.

New refinery capacity will take the pressure off overstrained California oil firms now importing at premium prices. A construction contract for the largest refinery, 250,000 bbl per day Shell unit at Anacortes, Wash., was awarded last week to Bechtel.

Two more new refineries are also underway: a 35,000-bbl-per-day General Petroleum unit at Ferndale, Wash., and an 11,000-bbl installation of Standard Oil of Canada at Vancouver.

Standard of California has 2000 acres near Seattle, where a major refinery is expected. Imperial Oil of Vancouver is expanding its 12,000-bbl unit to 22,500 and Shell of Canada is raising capacity of its Vancouver refinery from 8000 bbl to 15,000.

Competition Inevitable

Rocky Mountain oil producers are keeping an eye on the 285,000-bbl-per-day Pacific Northwest market. They have been trucking and piping in about 30,000 bbl per day.

Now, a new 30,000-bbl-per-day pipeline from Billings, Mont., is under construction. The 566-mile line from Salt Lake is being expanded. Combined capacity of these two lines will be 72,500 bbl per day next year.

Oil companies are confident that for the next few years at least they will be able to sell all they can deliver. As pointed out by a Stanford Research study, demand will grow to 313,000 bbl per day by 1955 against 285,000 bbl today. Huge Edmonton capacity of 300,000 bbl may make stiff competition inevitable.

What's Ahead In Metallurgy?

◆ Right in the theme of the Metal Show issue THE IRON AGE brings you an interview with Ralph L. Wilson—the man who has headed American Society for Metals this past year.

◆ Mr. Wilson, who is director of metallurgy, Timken Roller Bearing Co., has had a distinguished career with firms like Alloy Steel Corp., Timken Steel and Tube Div., Climax Molybdenum Co.

◆ He gives a frank appraisal of metallurgy's contributions to past progress, and its brightest hopes for the future.

Does metallurgical research pay its way in dollars and cents?

It is always difficult to say when or where basic research can be made to pay for itself. But applied or industrial research in metallurgy is used to perfect processing techniques, improve existing products, or develop new ones. Such gains can be measured in dollars and the expenses of the research amortized.

What avenues of research in metallurgy offer the brightest prospect for progress?

In my opinion the following offer great potential rewards:

(1) Measurement and control of stresses in finished parts as affected by manufacturing methods.

(2) Study of trace elements in steel and the effects they produce. Among these would be: Oxygen, nitrogen, hydrogen, boron, and the rare earth metals.

What do you believe have been the greatest advancements in metallurgy since World War II?

Development of high-manganese, low-nickel austenitic stainless steels and introduction of high strength pearlitic low-alloy steels for rotor discs in jet engines and gas turbines.

In view of all the past work on boron steels, do you feel that industry generally has taken advantage of these steels—or have

their possibilities been over-rated?

A continuing market appears to be in prospect for medium carbon through-hardening alloy steels containing boron. Moderately alloyed boron carburizing steels may also find a place in our economy, especially if case carbon content can be controlled. Low alloy boron carburizing steels do not look promising because of low case hardenability. Certainly a critical shortage of manganese and chromium at any

Great Potential Rewards

Here is a promise to industry and a challenge to metallurgists.

Mr. Wilson believes the following offer "great potential rewards":

(1) Measurement and control of stresses in finished parts as affected by manufacturing methods.

(2) Study of trace elements in steel and the effects they produce. Among these would be oxygen, nitrogen, hydrogen, boron, and the rare earth metals.

time would stimulate greater usage of boron steels.

Is wider knowledge of good heat treating likely to reduce our use of scarce alloys—or might this reduction be offset by more use in missiles, rockets, etc.?

Our savings of scarce alloying metals in engineering steels is



Ralph L. Wilson

accomplished by more effective hardening of leaner compositions. Wider adoption of the best hardening practices and installation of necessary equipment will result in better economy in the use of our resources. It is expected that alloying metals saved will be made available for military equipment, but it will also be imperative that missiles, rockets, and the like, be designed for the least use of special metals.

What is the supply outlook for metallurgical manpower?

The Engineering Manpower Commission of the Engineers Joint Council estimates that there is a prospect of 17,000 engineering graduates in 1954. This compares with about 21,000 in 1953. While the trend for total engineering graduates is thus downward, enrollment in metallurgical courses is now increasing in many schools. A few years hence this will be reflected in larger graduating classes in metallurgy. Meanwhile, more effective use is being made of graduate metallurgists by relieving them of duties which can be performed by research assistants and technicians.

Do you believe colleges are doing an adequate job of preparing young men as metallurgists? What changes would you suggest?

I believe undergraduate courses in metallurgy represent generally a satisfactory combination of basic theory in engineering and a varied emphasis on practical training along particular lines. Any employer who recruits graduates from several schools can have the benefit of interchanges of these different experiences among engineers.

Do you feel industry is taking full advantage of metallurgical progress?

Industry has done a fine job in adapting recent metallurgical advances to present manufacturing processes. However, there are some metallurgical techniques that would require investment in new equipment to take full advantage of possible improvements. Thus, utilization of a good many discoveries will appear slower than warranted.

Is industry making adequate facilities available to metallurgists?

Expenditures by industrial firms for research on metals can perhaps be taken as proof of the interest they have shown in supplying metallurgists with proper facilities to pursue their work. Since World War II several very large laboratories have been built and many others have received important additions to equipment, especially for investigations in the fields of X-ray, electron microscopy, gases in steels, spectroscopy, and mechanical testing at low temperatures.

What do you think of the possibilities of hot steel extrusion from a tonnage viewpoint?

At the present stage in development of hot extrusion of steel, operating and maintenance costs are high, and rate of production comparatively slow. Hence, this method of shaping steel seems best suited now for making products of highly-alloyed compositions, some of which offer great difficulties in hot-rolling or in piercing for seamless tubing.



VACUUM CLEANER is a typical factory sight—the 41,000-sq-ft floor is vacuumed daily.

Plant Bars Dust, Dirt

Perfect uniformity in making welding electrodes is no special trick in a hygienic laboratory—but mass production under usual factory conditions is a different story.

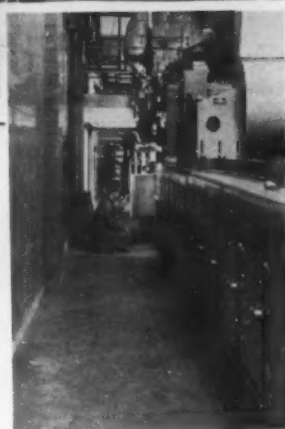
For example, a bit of dirt lodged in an extrusion press can affect the quality of an entire batch of rods. At a rate of 20 rods extruded per second, a lot of rods can end up in the scrap pile.

So A. O. Smith Corp. erected a factory with unusual conditions built in. It's a housekeeper's dream plant.

Glazed tile interior walls and an exterior needing no paint pare maintenance. Windowless design permits exact control of filtered air coming in and allows indoor air pressure to be kept slightly higher than outside. This results in dust and dirt seeping out through cracks instead of in. Fuel for heating both the building and the baking ovens is propane gas.

Fixtures in wash rooms, locker rooms, and lunch room are installed to keep the floor clear and easy to clean. Temperature and humidity are carefully controlled in raw material storage rooms to prevent moisture pickup.

Even the Lancaster, Pa., location is in strict keeping with cleanliness—it's in the heartland of the tidy Pennsylvania Dutch.



OVEN, 150 ft long, has complex control system.



LAZY SUSAN inspired this merry-go-round handling device for raw material weighing station.

LIFTING ZONE

**Herc-Alloy
over the
load...**

**Greater
safety under
the load**

DANGER ZONE

PHOTO COURTESY OF THE BUDD COMPANY, PHILADELPHIA

SPECIFY

HERC-ALLOY

SLING CHAINS



Write
for Data
Book

HERC-ALLOY
...is the
original alloy
steel chain

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Mobilization

Tools:

ODM forecasts new orders for defense production items.

First steps in the government's use of new funds to stockpile production machinery are pointed out in the latest defense mobilization report to the President.

About mid-November, the report forecasts, Defense Dept. will turn over to Office of Defense Mobilization "full mobilization production schedules" for 1000 end items of vital importance to national preparedness.

Some of these items, THE IRON AGE has been told, are related to the Vance Committee recommendations on acquiring machine tools for rapid employment in case of war. In short, to meet the production quotas the military is going to name, certain necessary equipment will have to be ordered.

Keep Tools Near Plants

This situation should make it possible for Defense Dept. to use at an early date some of the \$200 million Congress voted in response to Vance Committee urgings, supported by testimony from official blueprinters.

Wherever possible, older machine tools, now owned by the government, are going to be kept close by the plants which would use them in an emergency, ODM says.

Obvious in this decision is a break from the earlier idea that government-owned tools not needed on defense production lines should be stored centrally. Drawbacks to this system, as a general routine, are summed up by ODM:

1. Specific plant identity is easily lost when tools from many plants are grouped in a giant warehouse.

2. When a crisis occurs requiring use of these tools, there's danger of delay in distribution because of shipping bottlenecks.

3. Transportation and handling costs are multiplied when tools are centralized for storage, then distributed, later brought back to government warehouses again.

STEEL: Secret's Out, Competition Here

U. S. Steel announcement on freight absorption makes it official . . . Will be widespread soon . . . Question, answer list of what's happening, what it means—By J. B. Delaney.

The secret is out: The steel business is growing more competitive.

Sales policy statements by steel producers are a public acknowledgement of a competitive situation that has existed for weeks in some products. Flurries of sales statements came from steelmakers after U. S. Steel Corp. announced its freight absorption policy within a more competitive market.

What the producers are doing about it is no more than what makers of sewing machines or automobiles would do in a similar situation—meeting competition by making concessions to customers whose business they want to hold.

THE IRON AGE has been talking for weeks about freight absorption by producers, largely small independents up to this time, as competition became more intense in such products as stainless steel, merchant wire products, and, to a lesser extent, mechanical tubing.

Products Affected First

It predicted that major producers would participate as their own order books grew slimmer and desirable business was threatened. The big mills have now formally announced either that they are absorbing freight or that they are contemplating doing so. Without question, all of them will get into the act in short order.

First products to be affected by freight absorption are the weak sisters—tinplate, wire products, stainless, welded pipe, cold-finished bars, and hot-rolled bars. Products still in strong demand are largely unaffected. These include oil country goods, seamless tubes, plates, shapes, and cold-rolled sheets. No one is going to absorb freight, either, on unprofitable semi-finished items.

Here are some questions and answers that indicate what is hap-

pening on the basis of inquiries to major producers, including U. S. Steel, and Jones & Laughlin Steel Corp., the first mills to publicly announce their policy on freight absorption:

Q. What is the policy of mills on freight absorption?

A. It boils down to this: The producers will absorb freight charges if necessary to retain business of desirable customers.

Q. How will this be done?

A. Each case will be decided individually. The mills will do nothing without some evidence that a competitor is underselling them.

Q. Will producers offer the same terms to consumers within the same city or area?

A. Not necessarily. If the business of one consumer is considered unattractive by the producer, he might concede the business to a competitor. However, customers in the area that the producer continues to serve will receive identical price terms.

Q. How far will the mills reach out to remain competitive?



"It doesn't bother him a bit. Lead is a poor conductor of electricity."

A. That will depend on how hungry they are for business, the customer involved, and the product. For example, Pittsburgh district mills are absorbing freight charges to the West Coast to retain business of good tinplate customers. On another product for another customer they wouldn't dream of reaching that far.

Q. Are the mills within their legal rights in absorbing freight in this manner?

A. The Federal Trade Commission has indicated it favors freight absorption to meet competition on an individual basis. The mills, obviously, feel that what they are doing is perfectly legal. On the other hand they will press for legislation at the next session of Congress to spell out their right to absorb freight to meet proven competition.

Q. How does freight absorption benefit the steel user?

A. It means that he can obtain steel from all mills that want to serve him at the same price terms as those available from his nearest supplier. Heretofore steel from his more distant suppliers cost more due to the heavier freight charges.

Q. What effect will freight absorption have on steel profits?

A. Naturally, it will tend to reduce earnings since the margin of profit on products affected will be reduced to the extent of freight charges absorbed. On the other hand, absorbing freight on one product may be the only way of retaining business for more profitable items.

Q. Are the steel producers returning to the old multiple basing point system?

A. No. They are meeting competition where they find it, providing they consider the customer involved important enough to them.

Q. Will the producers continue to quote F.O.B. mill prices?

A. Yes. Also, if the customer desires, they will quote delivered prices reflecting full freight charges, and, to meet competition a lower delivered price.

AUTOS: Steel Deliveries Downtrending

Blame Detroit inventory juggling for lag . . . Reasons: seasonal auto cutbacks, GM fire, easing steel supply, perhaps a dash of panic . . . What buyers think—By R. D. Raddant.

Deliveries of automotive steel are sagging badly and in most cases inventory control is getting the blame. Auto companies, the biggest consumers of sheets, are having their troubles keeping their steel stocks within reasonable limits.

Seasonal cutbacks and enforced halts of production due to the General Motors fire occurred when conversion deliveries reached their height and mill deliveries started to come through as steel supply eased. Duplication of orders also began to show discomforting results as steel began to free in all directions.

Stocks up to 90 Days

As a result, auto companies which had operated for months on a hand-to-mouth basis and on inventories that seldom reached more than a few days suddenly found steel stocks building up to unprecedented levels. Cancellations and holdup orders followed in rapid succession.

Today many automotive and parts suppliers have inventories that run as high as 90 days and have cancelled October, November, and even December orders while they wait for their steel stocks to dwindle.

There are some notable exceptions, of course. Production rates in some segments of the Big Three are still exceptional. The Bethlehem

strike particularly hurt one of the trio which maintained such high output that inventory cannot accumulate to any degree.

Here are some typical comments from buyers:

"Tonnagewise we have a heavy inventory although we are still not balanced on all items such as killed steel and other specialties. Our October orders are down, November will be close to normal, and by December we will be ready to take a full quota," one buyer for a body manufacturer said.

"Our steel purchases are down considerably because our customers just aren't producing," declared a steel buyer for a major automotive supplier. "Fourth quarter cancellations in some cases have been 100 pct with large cancellations across the board."

"Our inventory became overextended because of the Detroit Transmission fire," reported the purchasing agent for a Hydra-Matic user. "But it will be down to normal by Nov. 1 and we will then resume a full purchase schedule."

"We didn't cut back our inventory fast enough," another steel purchasing agent declared. "October sheet and strip purchases will be about 70 pct of normal but we should be back to our usual position by Nov. 1."

Automotive inventories now range from a high of perhaps 90 working days to less than 30. However, those with the shortest inventories are generally the biggest steel users. It should be remembered in evaluating inventory cutbacks that the biggest steel consumers have cut back the least.

Any student of automotive statistics can consult production records and come close to guessing where the long inventories are. And anyone visiting an auto plant can see sheets stacked to the rafters.

One body builder is reported to have put 80,000 tons of flat-rolled steel back into the open market. A Detroit warehouse is said to be storing 100,000 tons of flat-rolled for a consumer who has no room for it.

Salesman's Evaluation

Inventory control measures are tied directly, of course, to the economic conditions of each company and the effects of the GM fire. As production schedules slowed, or ceased in some cases, inventories piled up fast.

At the other end of the telephone line from steel purchasers, the salesmen who service automotive customers find it difficult to evaluate the present situation.

"They were cancelling everything right and left during September," one representative said. "Most of them said it was inventory control, but a lot of it was panic. Now some of them have cancelled too far and are begging for more tonnage."

"One of our biggest customers dropped out completely in November, but has already notified us that December will be normal," said one.

Some auto producers are definitely finished with their 1953 production even though introduction of 1954 cars is still months away. This means weeks and even months of idleness and wholesale cancellations of steel.

There is another angle in gaging steel inventories—personal property taxes. It costs about \$40 for each \$1000 worth of steel on hand in Detroit when assessment day rolls around. That can add quite a bit to the price of steel and is one good reason for having steel in someone else's hands.

Fabricated Structural Steel Contracts, Shipments, Backlog

	Estimated Net Tons		
	1953	1952	Avg. 1947-50
CONTRACTS CLOSED			
August	243,525	252,849	212,899
Year to Date	2,019,512	1,731,230	1,528,598
SHIPMENTS			
August	250,507	226,277	204,948
Year to Date	2,041,281	1,725,107	1,491,792
BACKLOG	2,121,665	2,363,487	1,287,828

Source: American Institute of Steel Construction

STEEL: More Tubes for More Oil

Colorado Fuel & Iron opens new seamless tube mill . . . First west of Mississippi . . . In heart of market . . . Has freight advantage, modern equipment—By W. V. Packard.

The new Colorado Fuel & Iron Corp. celebrated a noteworthy step in its long-range program of expansion and diversification this week when it officially opened its new seamless tube mill at Pueblo, Colo.

The new mill, first of its type west of the Mississippi, will supply seamless steel tubing and casing to the oil and gas industries of the western U. S. and Canada.

Still In Short Supply

Drill pipe and casing, along with other oil country goods, have been in short supply for a long time, and they are still near the top of the list of hard-to-get steel products. They are expected to be among the last products on which steel producers catch up with demand.

Completed on schedule at a cost of \$30 million, the mill has a capacity of 150,000 tons of seamless pipe a year. President Al Franz reported a backlog of orders has already been accumulated and peak production will be achieved as quickly as possible.

Sizes of seamless tubes turned out by the mill will range from two and three-eighths to nine and five-eighths in. OD.

Enjoys Freight Advantage

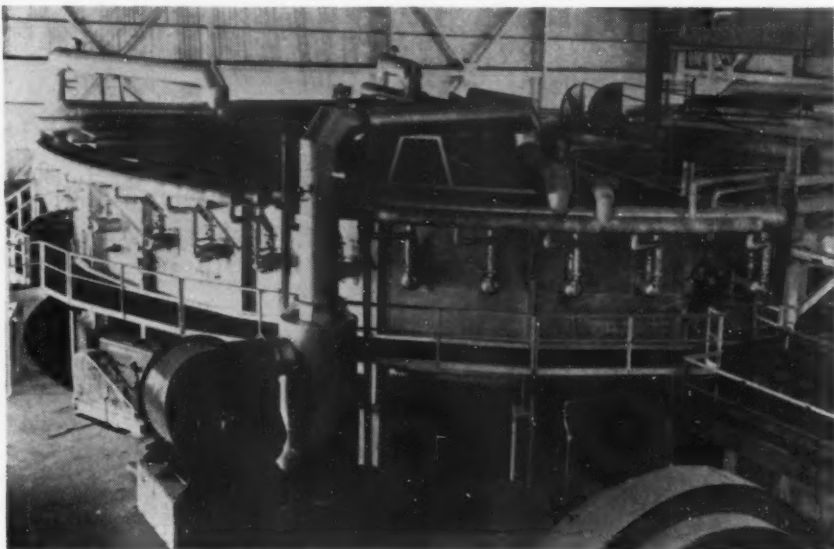
The plant is a welcome addition to the steel-short West. Centrally located between the great oil and gas fields of Oklahoma, Kansas, Wyoming, West Texas, the Pacific Coast, and Western Canada, the plant will enjoy a freight advantage over seamless tube producers in the East. No matter who pays the freight, the cost advantage remains.

The billets, or tube rounds, are pierced by two, 304-ton piercing mills driven by 3000-hp motors. Pierced rounds then pass through

a 1500-hp rolling mill which lengthens them and makes the walls thinner. Expanding mills then straighten and smooth the tubes. Finally, sizing-reducing mill finishes the tubes to specifications.

Install Large Furnace

An interesting and vital part of the production setup is a 70-ft rotary furnace—one of the largest ever built—which provides uniform, accurate heating of the rounds before piercing. Rounds are automatically loaded into the furnace by a hydraulic charging machine. Loaded radially on a re-



SATAN'S MERRY-GO-ROUND is an apt name for furnace that heats rounds before piercing.

volving hearth, they turn slowly past 60 gas jets (40 on the outside circumference and 20 on the inside). Rounds are automatically discharged at 2300 F.

Gas burning equipment and hearth driving machinery are located in the center of the four-zone furnace. Closely controlled turntable speed is recorded in feet per minute.

Within the past few years CF&I has changed from a western rail

producer to a far-flung organization with fingers in many products and market areas. About half its operations are now east of the Mississippi.

Much-needed product diversification has been achieved by expansion and acquisition. Product range has been broadened from a rail and fastener base to include a wide range of wire products (including specialties), construction supplies, cold-rolled specialties and seamless tubes.

Time table of acquisitions is as follows: Wickwire Spencer merged with CF&I, 1945; Worth Steel Co., Claymont, Del., acquired March 1951; E. & G. Brooks Iron Co., Birdsboro, Pa., and its subsidiary, Richard Ore Co., Wharton, N. J., acquired January 1952; John A. Roebling's Sons Co., Trenton, N. J., acquired in January 1953. The total is impressive.

Fairless Works Starts on Pipe

Continuous weld pipe output has started at the Fairless Works of National Tube. Initial operation at this U. S. Steel Div. plant was reached with the rolling of 1½-in. diam pipe on the first of two continuous weld mills.

Facilities at National Tube include a skelp mill, two continuous weld mills, galvanizing and finishing departments.

what makes a

Champion?



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—Manpower—

TOOL, DIE: Film

NTDA movie shows how apprentices learn in modern way ... No "broom training" now.

This week the Cleveland chapter of National Tool & Die Makers Assn. premiered a 22-minute film outlining the steps young apprentices are now taking in an 8000-hour course leading to journeyman papers. The film is just one phase of a concerted campaign to get some 800 member firms and the public interested in a youth movement that should pay off in 10, 20 and 30 years.

Hardly any tool and diemakers will deny that some selling has to be done. Many firms still haven't set up apprentice programs while others seem content with old fashioned "broom training" which keeps the apprentice on a floor sweeping job instead of at a machine.

In the past few years low wage scales have also driven older GI's out of training programs simply because they couldn't afford to invest 4 years at low pay.

Although there is still a lot to be done, NTDA's very active apprentice committee and forward-looking member firms have gotten off to a good start. They have generally found that it doesn't take a mint to set a good program in motion.

One Firm's Program

Cleveland's Barth Stamping & Machinery Co. employs about 400 men in its new suburban plant. Skilled designers and benchmen devote their time to making a variety of products ranging from lamination dies to precision gages for propeller parts. The young fellow training at Barth is promised wide experience.

Before hiring the 10 men now taking apprentice training, the company really put them through the aptitude wringer. In addition to a battery of mechanical tests, boys were also checked for family background, technical high school training and motivation. The

Recruits Trainees

Cleveland firm prefers boys whose dads have machine shop backgrounds. A lad who has completed 4 years in a technical school with good grades is also acceptable.

Once an apprentice has been singled out for training he starts a 4-year program vastly different from the system which generally prevailed a few years ago. They spend from 52 to 60 hours per week in apprentice shop, classroom and plant. Under the guidance of Roy Jenkins, a veteran tool and diemaker with a BS in education, the boys get their hand in from the start.

Every apprentice serves 2 months on the lathe, shaper, surface grinder, milling machine and tool crib in the apprentice department. Then he serves 4 months on the same machines in the main plant. Total time spent on each machine tool is 6 months.

College For 2 Years

In addition, whenever possible, the apprentice will get the opportunity to serve some time on special machines like the jig borer, jig grinder, boring mill and Keller mill. Practical training experience ends with 2 months in heat treat and 6 to 10 months on the bench under the guidance of veteran designers and tool makers.

Actual training on machines is carried on in conjunction with 6 weekly hours of classroom work in shop math, blueprint reading and drawing, plus time spent on theory of speeds and feeds.

Following a period of 1½ years, apprentices enter Cleveland's Fenn College for 2 years of study in die designing.

Barth's industrial relations director Matt C. Cotabish estimates that the program so far has cost about \$50,000. In order to keep the program rolling he anticipates a yearly outlay of from \$30,000 to \$40,000. At first glance that seems like a lot of money but Mr. Cotabish says the company expects to receive dividends, "because we're investing in the future."

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required on
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CONVENTIONAL TYPE BALL BEARING. Arrows in this illustration indicate the unavoidable friction when the balls are in contact with each other.



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PEOPLE: Make Them Work, Like It

Pitney-Bowes plan to make workers think like management . . . Includes jobholder meetings, profit-sharing . . . Help employees prepare for retirement—By E. C. Kellogg.

One firm that has had considerable success in making people work and like it is Pitney-Bowes, Inc., mail-meter manufacturer, Stamford, Conn. Because of its progressive ideas on how to handle people, American Management Assn. asked four of the company's top personnel executives to explain its policy to 1200 AMA members attending a 3-day personnel conference in New York last week.

Workers Buy Stock

An indication that Pitney-Bowes has been able to create a healthy employment climate is its comparatively low personnel turnover rate which is more than one-third below the average for the area.

Company's policy of trying to break down the traditional gap between employee and management thinking is an important factor in keeping turnover low. Some of the methods used to harmonize worker - management attitudes are: annual "jobholder" meetings, printed reports to employees, profit-sharing through stock purchases, and an active employee suggestion program.

At the jobholder meeting, held

the same week as the annual stockholder meeting, the president of the company explains the details of the annual financial report, outlines the company's plans and problems, and answers questions from the floor.

Workers are also permitted to buy stock in the company through payroll deductions. The company regards this plan as its most ambitious attempt at breaking down the differing attitudes of management and workers. It has also found profit-sharing to be a "relatively painless way of teaching basic economic facts and the essentials of business management."

Since 1948, Pitney-Bowes has been footing the bill of a retirement plan. There is no new twist to this plan, but the company's focus on preparing workers for the retirement adjustment is exceptional.

Normal retirement age at Pitney-Bowes is 65, though some workers may be kept on longer. But the program to help employees prepare for retirement starts when they reach 55.

An interview is held with a counselor who reviews the employee's financial situation, in-

come and expenditures to be expected after retirement, retirement money he should start saving now, and plans he should make to reduce his cost of living or to develop new sources of income.

Follow-up interviews are scheduled every 2 years until the employee reaches 63 and then are held yearly.

One of the Pitney-Bowes' spokesmen told the conference that introduction of time study and incentives into office work increased efficiency in one department from 65 pct to 117 pct in a relatively short time. Many of the office employees receive bonuses for the time they spend on rated work and as a result some are now making from \$5 to \$20 per week more.

The company does not regard these bonuses as an increased expense, since it pays nothing for the increase in efficiency from 65 to 100 pct and also gains on everything over 100 pct since it is getting more work for less overhead.

Indirect production workers participate in a group incentive plan in which a group bonus is earned whenever overhead expenses normally incurred in servicing direct workers are reduced by a certain amount.

Teach Secretaries

Direct production workers start at the minimum of the base rate range for the job they are doing and are paid a "merit rating" when they exceed minimum standard of production. Pitney-Bowes is now trying to work out a system for paying executives but realizes it will have to invent an entirely new plan.

Pitney-Bowes management thinks these programs are worthwhile, and evidence that employees believe they have increased job satisfaction is shown in a survey made by the company. Only 2 pct of the workers taking the test thought their work was "extremely dull"; 3 pct called their job "quite uninteresting"; 15 pct were indifferent, while 55 pct thought their work was "quite interesting" and 24 pct "very interesting."

Check Your Personnel Policy on These . . .

Facts on employee supervision that may help you increase production, and improve worker morale in your plant. Based on talks by Robert Schwab, personnel planning supervisor, Detroit Edison Co., and Rensis Likert, director of the Institute for Social Research, Univ. of Michigan, at American Management Assn. personnel conference.

- (1) Management overrates wages, piecework rates, employee benefits as production incentives.
- (2) Close supervision more often results in low production than in high.
- (3) Sharing job problems with employees is a more effective force in increasing output and improving worker morale.
- (4) There is a direct relationship between the frequency of employee meetings and the number of employees who believe their supervisor is good at handling people.

INDUSTRY: Expansion Pace Slows

ODM predicted \$12.5 billion expansions to be completed in '53 . . . Trim \$3 billion from forecast . . . Only 8.9 pct of certified expansions not started—By A. K. Rannells.

There are indications along the Potomac that industrial expansion may now have entered a phase comparable to the government's mobilization stretchout.

Here's the background: Early this year Office of Defense Mobilization summed up industry reports and figured that more than \$12.5 billion worth of tax-amortized new expansion would go into place this year.

Can't Make It

It looked like \$6.5 billion worth of expansion projects would be completed during first half, another \$6 billion during the final 6 months. First half reports are now in.

Unless the rate of construction is stepped up sharply, completions this year can't be expected to total more than half the original estimate.

First half completions amounted to little more than \$2.5 billion as against the expected \$6.5 billion. Only a slightly better rate is now indicated for the second half.

Industry More Cautious

Mobilization officials say the shortfall was caused partly by steel shortages brought on by last year's strike and other scarcities caused by unprecedented demand. This is only part of the answer.

There's no evidence to indicate to the government any retrenchment plans by industry. But there's a belief in some quarters that, with the pressure off, industry is now inclined to move ahead at a more leisurely pace—making sure it won't get caught behind the eight-ball.

Cutbacks in defense contracts are a factor, they say. Another is that expansion of productive capacity has now generally caught up to current consumption rates.

Defense Secretary Wilson indicates military spending will be trimmed by about 5 pct, a drop of about \$2 billion—but total outlay will still hover around \$40 billion for fiscal 1955. And the Air Force plans to step up production rate of the F-100 jet fighter and the B-52 heavy jet bomber.

Commerce Under-Secretary Murray says that there will be no cut-back in the production expansion goal for transport aircraft. This calls for 600 transport planes for commercial purposes but which could be converted quickly for military support or transport. Tax certificates are available for 230 more such craft.

\$2.3 Billion To Go

Here's the way the expansion program now stacks up:

As of Mar. 31, projects certified for accelerated tax write-offs were valued roughly at \$25.8 billion. Completions then amounted to \$6.3 billion or about 24 pct.

Another 67 pct or \$17.2 billion worth had been started. This left about \$2.3 billion in certified programs not yet under way.

At that time, 1953 was expected to be the big year, causing ODM to predict \$18 billion worth would be operating or ready to start up by the end of the year.

In light of the first-half slowdown, ODM is not expecting more than \$15 billion in completions, making 1954 the probable big year and providing an additional brake against a sudden sag in the economy.

Primary metals industries account for more than \$5 billion worth of certified projects—about 20 pct.

Steelworks and rolling mills account for about 50 pct or \$2.4 billion, involving 387 different projects. About \$1.8 billion had been completed in March and the re-

Expansion Through Certificates of Necessity

Approved Projects	Value Completed Projects (Millions of Dollars)	
	By Year	Cumulative
Before		
1951	387
1951	1,726	2,113
1952	3,573	5,687
Planned Projects		
1953	12,545	18,232
1954	5,522	23,754
1955	1,200	24,954
1956	597	25,551
1957	1,198	25,749
After 1957	39	25,788

mainder is scheduled to be finished by the end of 1954.

Some 97 blast furnace expansions have been certified, involving an expenditure of \$761 billion. About \$290 million worth of work has been completed with full completions scheduled by next July.

Less foundry expansion is scheduled. Plans involve 274 projects and \$102 million—\$82 million completed but all new facilities to be in place within 12 months.

Ore A Quarter Done

Close to \$1 billion had been certified for 127 iron ore projects. Completion date is December 1960 although \$231 million worth had been completed last March.

Certification has been made on 42 aluminum refining expansions covering \$843 million worth of new facilities. About \$450 million has been completed and the program's end is set for September, 1956.

Director Flemming of ODM says that the agency is still engaged in reviewing these expansion goals. Decisions as to which are to be revised may soon be made.

Washington figures that any revision downward won't have much effect on the overall program. Decisions would be on a selective basis and, it is pointed out, work has already begun on all but 8.9 pct of the projects.

ODM: Flemming Report to White House

We have enough hard goods for bread and butter economy . . . Focus on flexible plans for new crises . . . Review expansion, stockpiling . . . Steel supply considered plentiful.

Delivery rate of hard goods, about \$2.5 billion a month, is now largely sufficient to meet both civilian and military needs under present mobilization planning. From now on attention is to be centered on working out a "flexible set of plans" for taking care of "new emergencies."

This is the substance of the latest report by Mobilization Director Flemming, made to the White House on Sunday. Probability that Russia has hydrogen weapons is covered under "new" emergencies.

What ODM Will Do

Specifically, future efforts of the Office of Defense Mobilization are to be centered on four major points:

(1) Review of current expansion goals; (2) locating gaps and weak spots, taking specific steps to speed up and broaden the mobilization base where needed; (3) devoting more attention to stockpiling—both strategic materials and capital equipment; (4) developing a workable controls plan for full mobilization.

Expansion goals scheduled to meet defense requirements have been met in 100 out of 233 programs, Dr. Flemming estimates. Review is now going on with a few to be expanded, some to be trimmed a little, and others to go ahead as now planned.

Near Aluminum Goal

There's no reason for worry about steelmaking capacity, the ODM figures. Expansion goal was set at 124 million ingot tons plus, and actual capacity in place is expected to top 120 million tons before end of 1954. Coke is seen as 2 or 3 million tons short of supporting 1955 steel output.

As for aluminum, ODM hasn't

been able to make up its mind whether another round of expansion should be called for. Present goal is 1.7 million tons—of which 1.4 million is complete and another 100,000 tons is expected by spring.

Electricity is a factor here. Power facilities are going into place as fast as can be expected, and will amount to 92 million kw by end of 1953. But present goal of 116 million kw won't be attained on schedule.

Mobilization and other government officials will work with industry on plans for dispersal of defense-needed facilities and "protective construction" for those which can't be dispersed or built away from potential target areas.

Full 100 pct rapid tax amortization will be allowed for protective construction—which means about 20 pct more in cost for the better type of bomb-proofing.

Half in Target Area

Commerce Dept. is already knee-deep in a study of some 80,000 plants essential for wartime. So far, out of 190 plants given a top-essential rating, at least one-half are in probable target areas.

From a monetary outlook, stockpiling of strategic materials is about 65 pct complete. But from a more realistic viewpoint, Dr. Flemming says that out of 76 items currently being stockpiled, inventories for 24 are still 50 pct or more short of quantity goals.

Meeting the goals is expected to become easier, now that defense requirements are leveling off. Hard goods deliveries for first half 1953 totaled \$14 billion, largely adequate for present mobilization planning.

So work has begun on what is described as flexible plans. Most agencies have already submitted

estimates of what they would need in the way of steel, copper, aluminum and some other items if necessary to step up the defense program—or for war.

A similar report is due from the Defense Dept. not later than Nov. 15. But this is to include full mobilization production schedules for at least 1000 end items.

This list will include "a few" of the long lead time items suggested for stockpiling under the Vance plan, a top official told THE IRON AGE.

"We are (also) developing detailed plans for stabilization controls which can be submitted to Congress whenever it is decided that conditions warrant," Dr. Flemming told the President.

There is no thought, however, of ODM suggesting that the executive office be given standby authority to impose such controls, the defense director explained.

Nor will ODM seek any broad or overall authority, other than it now has, to bolster weak spots in the mobilization program. But the agency will ask Congress for authority and money to plug specific gaps as they are found.

Contracts Reported Last Week

Including description, quantity, dollar values, contractor and address. Italics indicate small business representatives.

Maintenance parts, 1540, \$909,376, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., *G. I. Lyman*.

Power and tank units, V, \$79,927, Minneapolis-Honeywell Regulator Co., Minneapolis, *S. F. Keating*.

Strut assemblies, V, \$827,523, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., *G. I. Lyman*.

Maintenance parts, V, \$45,366, Douglas Aircraft Co., Ltd., El Segundo, Calif., *W. E. Hough*.

Wheel assembly, 1421 ea, \$35,880, Aerol Co., Inc., Los Angeles.

Maintenance parts for strut assemblies, 2310 ea, \$2,075,319, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., *G. I. Lyman*.

Electrical equip., \$61,989, The Monitor Controller Co., Division of Ultrasonic Corp., Braintree, Mass.

Junction box, 5200 ea, \$62,400, Titeflex, Inc., Newark.

Repair parts for diesel engines, 32596, \$95,677, Cleveland Diesel Engine Div., General Motors Corp., Cleveland, *A. O. Chash*.

Repair parts for diesel engines, 13690, \$88,030, Fairbanks Morse & Co., New York.

Periscopic sextants, 2100, and sextant mounts, 1369, \$171,478, Kollsman Instrument Corporation, Elmhurst, N. Y.

Control amplifiers, master indicators, remote compass, transmitters, spare parts, 2715, \$1,499,144, General Electric Co., Schenectady, N. Y., *W. H. Bobear*.

Just as a football player needs protection . . .



IRON and STEEL *Need* PROTECTION

If your product is made of iron or steel, and exposed to the elements, protect it against the ravages of rust by Hot-Dip Galvanizing — the best possible rust preventive when applied by Hanlon-Gregory. For longer life, greater uninterrupted service and substantial savings in maintenance, specify Hot-Dip Galvanizing . . . SEAL IT IN ZINC.

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October 8, 1953



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Industrial Briefs

Established . . . THE YALE & TOWNE MFG. CO., New York, has established the Powdered Metal Products Div., consolidating the company's expanding operations in powder metallurgy.

More Important . . . THE STANDARD PRESSED STEEL CO., Jenkintown, Pa., has started something new. Its industrial anniversary book features the future and is appropriately named *50 Years—A Start For the Future*.

Chicago Headquarters . . . The Delta Power Tool Div., ROCKWELL MFG. CO., Pittsburgh, has opened a Central regional headquarters office at the Peoples Gas Bldg., 122 S. Michigan Ave., Chicago.

First Step . . . INLAND STEEL CO., Chicago, has awarded a dredging contract to Construction Aggregates Corp. of Chicago. It will be the first step in the development of Inland's iron ore mine in Steep Rock Lake, Ont.

Next Month . . . MILWAUKEE ASSN. OF PURCHASING AGENTS will sponsor the 1953 Products of Industry Exhibit to be held at the Milwaukee Auditorium on Nov. 17-19.

Diamond-Studded . . . ALUMINUM CO. of AMERICA, presented Roy A. Hunt, chairman of the executive committee with the Alcoa Fifty-Year Service Club Award. He received a diamond-studded lapel button for his 50 years' continuous service.

Dividend . . . ELASTIC STOP NUT CORP. OF AMERICA, Union, N. J., has declared a quarterly dividend of 25¢ per share on its common stock.

Distributor . . . GENERAL ELECTRIC CO.'s Carbology Dept. has named the Henry Walke Co., with offices in Norfolk, Va., and Charlotte, W. Va., a distributor.

"Outstanding Invention" . . . WESTINGHOUSE ELECTRIC CORP., East Springfield, Mass., awarded Gustav H. Koch, engineer, a \$5000 "outstanding invention" award, for inventing a way to make an electric fan blow more air.

Larger Quarters . . . BRAD FOOTE GEAR WORKS, INC., Cicero, Ill., has purchased larger quarters for its subsidiary, Pittsburgh Gear Co.

Moves Division . . . LINDBERG ENGINEERING CO., Chicago, has moved its Air & Hydraulic Div. from the main plant to 225 N. Laflin St.

Acquires Stock . . . GENERAL MOTORS CORP. has acquired all the outstanding stock of the Euclid Road Machinery Co., Cleveland, which will operate as a wholly owned subsidiary.

Truck Rep. . . BAKER-RAULANG CO., Baker Industrial Truck Div., has appointed Baker-Lull Associates, Glenside, Philadelphia, Pa., as representatives for its trucks and cranes in eastern Pennsylvania and southern New Jersey.

New Location . . . DRAVO CORP., Machinery Div., Pittsburgh, moved its Heating Dept. headquarters to the Chamber of Commerce Bldg., 411 Seventh Ave., Pittsburgh.

Rotterdam Plant . . . WILLYS-OVERLAND EXPORT CORP., Toledo, has executed a contract with Nederlandsche Kaiser-Frazer Fabrieken N. V., Rotterdam, which provides for the immediate assembly at Rotterdam of the entire line of Willys passenger and commercial vehicles.

Canada Operations . . . EX-CELL-O CORP. will extend its operations to Canada. A wholly-owned subsidiary, Ex-Cell-O Corp. of Canada, Ltd., has been formed and negotiations have been completed to purchase Henry Power Tools, Ltd., and Craftools, Ltd., Ontario.

Acquires Mine . . . PITTSBURGH CONSOLIDATION COAL CO. has purchased the Weirton mine, located near Morgantown, W. Va., for \$1,500,000 from National Steel Corp.

Extended Services . . . Armour Research Foundation of ILLINOIS INSTITUTE OF TECHNOLOGY, Chicago, will extend its technological experience and services to the South American republic of Uruguay under a contract just signed with that nation.

Exclusive Basis . . . TRANSMISSION EQUIPMENT CO., INC., New York, has become exclusive sales representative throughout the U. S. and Canada, with the exception of New England for Acme Welding, Div. of The United Tool & Die Co.

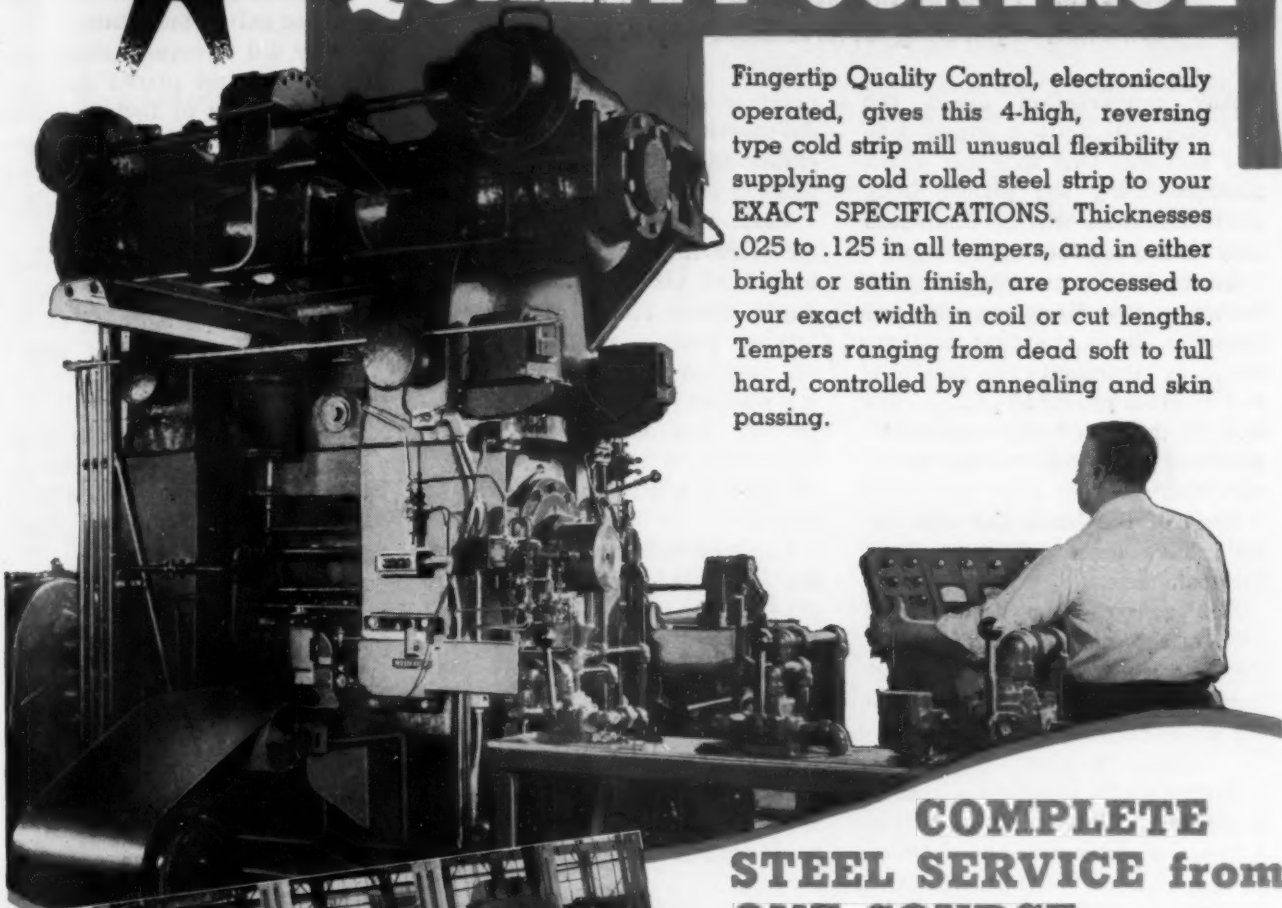


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QUALITY CONTROL

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Tony Canedo, Sales Representative

Air Corvette's Innards, Methods

Chevrolet discloses production techniques of first plastic sports car . . . All plastic means all plastic . . . Advantages, economies, engineering features listed—By R. D. Raddant.

Any conversation about the Corvette will split a group into two sections. One will talk about manufacturing the plastic body while the other will be interested only in the car itself.

Chevrolet is probing the unknown in two directions with the Corvette. It is the first real attempt to investigate the possibilities of mass produced plastic cars and the initial attempt by a major producer to tap the growing sports car field.

Most of the basic Corvette details have been public property for some time.

But construction details and some of the economics of the plastic body were shown for the first time last week at Chevrolet's six-car assembly line at Flint.

Everything's Plastic . . . In a separate building, 61 separate parts are delivered and bonded

together into an all plastic body. All plastic means just that and includes the floor panel—basic element in the body construction.

Parts are bonded with a polyester resin into three main assemblies and other smaller components. Some rivets are used in joining plastic parts, primarily for positioning. Small steel backing plates are used where plastic-to-steel connections are made. Otherwise, there is no concession to plastic where it is joined to metal.

Going back to the basic material, the laminated method is used to produce the plastic body parts of fiber glass mats and polyester resins.

Use Bag Method . . . But even while the Corvette is in production, new methods are constantly being adopted. Most of the plastic parts are produced by the so-called

bag method. Parts made this way require a lot of buffing and finishing and it is already being replaced for some parts by match metal dies which eliminate many of these extra operations.

Why did Chevrolet choose plastic in the first place? Answer is a combination of factors—including time, expense, desire to experiment, novelty of the idea, and conviction that a plastic body is basically sound.

Decision to use plastic was not made until late January 1953. If steel dies had to be made for steel bodies the dies would still be under construction.

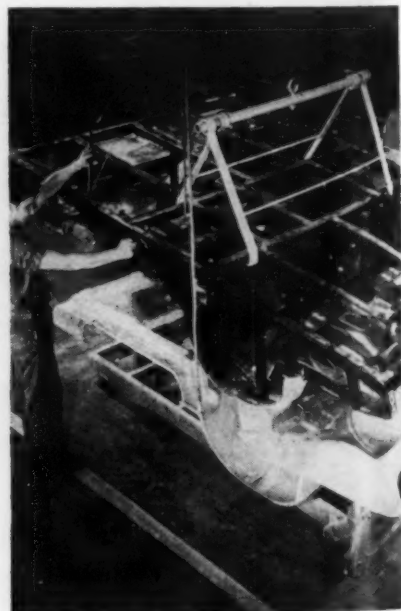
Cheaper Tooling . . . It is estimated that tooling for the fiber glass cost \$500,000 against tooling costs for steel dies of possibly \$4½ million.

Chevrolet had some experience to draw from, though it was not gained in this division. Cadillac made some plastic replacement fenders at the close of World War II after original dies had been scrapped. E. N. Cole, now Chevrolet chief engineer, held the job at Cadillac at that time.

Turn Page



FIRST STEP in making Chevrolet's plastic Corvette was construction of mahogany die model. Finned rear tail-light housing (inset) is hardest part to mold.



DRILL JIG is lowered over reinforced plastic underbody as a guide to locate holes needed in riveting body to frame.

A basic advantage is that plastic permits lighter weight without sacrificing strength. The plastic body weighs 411 lb while a steel body would weigh at least 200 more. Plastic is more resistant to shock and damage can be localized. Breaks in the body can be repaired quickly and a repair kit is being developed.

Needs More Labor . . . Fabrication of plastic bodies requires much more labor and greater floor space. But new developments indicate that a "station system" may be developed to produce real efficiency.

Two problems are expansion and moisture absorption. Coefficient of expansion is close enough to that of steel that no provision is made when attaching the body to the steel frame. Moisture absorption problem has been solved almost completely, partly by processes which prevent capillary action along the glass fibers.

A Fast Ride . . . Original 160-hp engine was cut down to 150-hp to improve slow speed performance. It can still push the Corvette at 100 plus mph, a fact that THE IRON AGE can attest to on the basis of a whirl around the GM test track. It develops an engine torque of 223 ft lb. Any real hot rodder would have no trouble souping it up.

Engine is of basic Chevrolet 235 cu in. design, but has three carburetors, each feeding two cylinders. A double acting fuel pump has a vacuum booster. The engine carries high lift cams and a dual exhaust system.

In the present pilot plant only a token production rate is maintained. After the first of the year, a rate of 1000 a month will be reached and production will be moved to Chevrolet's St. Louis plant.

Distribution will still be directed from Chevrolet's central sales for at least a year. Price is \$3490 delivered, but with a total of 7600 Chevrolet's dealers, it will be a long time before any can take orders directly.

Drivers:

U. S. will soon have 54.7 million automobile owners.

This year U. S. motor vehicle registrations will reach an estimated 54.7 million, according to the annual book of automotive facts just released by the Automobile Manufacturers Assn.

This means that there is one car, truck or bus for every three persons in the U. S., or about one for each family.

Other figures show that this country's motor vehicles are traveling more than 500 billion miles a year, with highway users paying \$5.3 billion in special taxes in 1952. But in terms of constant dollars, 1952 highway expenditures were below prewar levels.

Analysis of scrappage estimates shows that motor vehicles today live twice as long and work four times as hard as in 1925. Age of cars scrapped in 1951 averaged 14 years and average lifetime mileage was 121,000. Wholesale value of motor vehicles built last year was

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Oct. 3, 1953 . .	119,210*	23,747*
Sept. 26, 1953 . .	116,635	24,318
Oct. 4, 1952 . .	111,169	32,065
Sept. 27, 1952 . .	110,145	31,083

*Estimated: Source Ward's Reports

\$8.7 billion and replacement parts and accessories had a wholesale value of more than \$2 billion.

Pontiac Won't Have V-8 in '54

There have been rumors that Pontiac might have a V-8 in 1954. Deliveries of machine tools and stories of a pilot engine line started the talk about a new engine.

However, it is now established that there will be no Pontiac V-8 in next year. It still isn't known if tool deliveries held up the change or whether late changes in design made a new engine impossible for an early introduction. There is also the possibility, best known to Pontiac officials, that there never was a real intention to have the engine ready for '54.

THE BULL OF THE WOODS

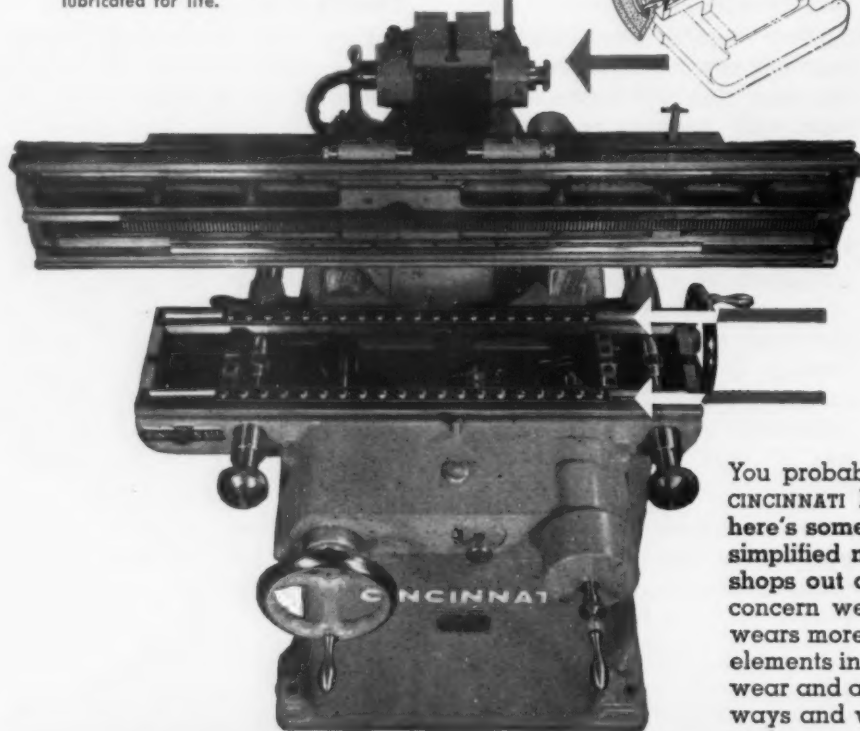
By J. R. Williams



You're looking at *Low-Cost* maintenance of cutter and tool grinding equipment

A big Cincinnati advantage

Grinding wheel spindle cartridge, CINCINNATI No. 2 Cutter and Tool Grinder, can be replaced in an interval of minutes. Spindle is mounted on anti-friction bearings lubricated for life.



Sectional view of grinding wheel spindle cartridge.

Anti-friction ways, CINCINNATI No. 2 Cutter and Tool Grinder, are hardened and ground, easily replaceable.

You probably know all about the versatility of CINCINNATI No. 2 Cutter and Tool Grinders. But here's something you may not know about—the simplified maintenance features that help many shops out of a tight spot. Two of these features concern wear. As you know, every mechanism wears more or less in use, but there are only two elements in CINCINNATI No. 2's that may eventually wear and affect performance—anti-friction slide-ways and wheelhead spindle. Should they need replacement after years of service, the job can be done by your own men in about two hours' time. Replacement ways are hardened, ground to "dummy" units in our shop; the wheelhead spindle is completely assembled in a cartridge unit. Anti-friction slideways; enclosed motor with plenty of room for maintenance; dual table controls at front and rear; wide selection of attachments for sharpening all types of cutters including sintered carbide . . . these and other features of low-cost cutter sharpening are fully illustrated in a 44-page catalog. You may obtain a copy by writing to our nearest direct office or agent, or the address below.

THE CINCINNATI MILLING MACHINE CO.

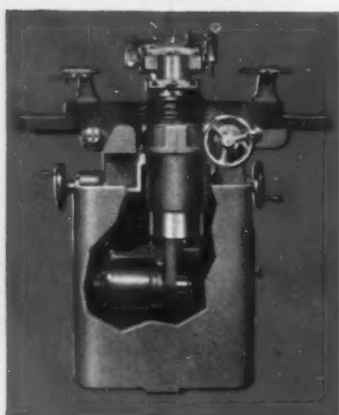
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CINCINNATI No. 2 Cutter and Tool Grinder. For complete information write for catalog No. M-1734.



The motor is enclosed in the base, yet there is ample room for maintenance.

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Sales Tax Seen Too Hot to Handle

**Administration won't seek consumer levy in election year . . .
But manufacturers' tax may be just as hard to sell Congress
. . . Draft quota may hold, then rise—By G. H. Baker.**

Loud protests against a national sales tax—coming principally from retailers, but also from the consuming public—have convinced the Eisenhower Administration that this particular potato is too hot to handle at this time.

Alternative, on the basis of current Treasury thinking, is to recommend congressional enactment of a manufacturers' tax. Politically, a manufacturers' tax may be just as hard to "sell" to Congress as a retail tax, but informal public opinion polls rate a producer tax as a less hazardous election-year risk.

Won't Levy Consumers . . . Treasury decision to omit any request for a retail tax virtually spells the defeat of any consumer-levy moves within Congress. Unofficial tallies of congressional reaction toward a sales tax reveal a largely adverse reaction. There are a number of reasons for this political attitude. First, 1954 is an election year, and Congress is unwilling to annoy the voters any more than is absolutely necessary in an election year.

Secondly, there is a widespread belief that the burden of a sales tax would fall most heavily on low-income groups. Thirdly, many members of Congress believe that any opening up of new sources of federal revenue might deter the entire Executive Branch of the government from its commendable goal of spending less—not more—of the taxpayers' money.

Draft Quota Won't Dip . . . Earlier government plans for slowing the manpower draft, thus partially easing industry's skilled worker problem, have been scrapped. Instead, monthly draft calls will remain at 23,000 men per month for

the time being, and may rise sharply next spring.

Pentagon draft experts are making tentative plans to jump the induction rate to about 37,500 men per month sometime during the first half of next year, and to boost the rate to 45,000 men per month in the second half of the year.

May Ask for More . . . Air Force and Navy (including Marine Corps) aren't ready to say so yet, but they are planning to ask for draftees under the expanded program. For the past two years they've been able to keep their ranks filled with volunteers.

Many draft-eligible youngsters signed up with the Air Force and Navy during the Korean war in the plausible belief that their chances of combat duty with either of these services were substantially less than with the Army. Now that the war is over, they prefer the Army's 2-year enlistment period to the Air Force-Navy 4-year hitch.

Sandbag Exit . . . Chances that the government will withdraw

from the synthetic rubber business next year are dim, in the opinion of Rep. Paul W. Shafer, R., Mich., co-sponsor of legislation designed to sell the multi-million warborn industry to private companies.

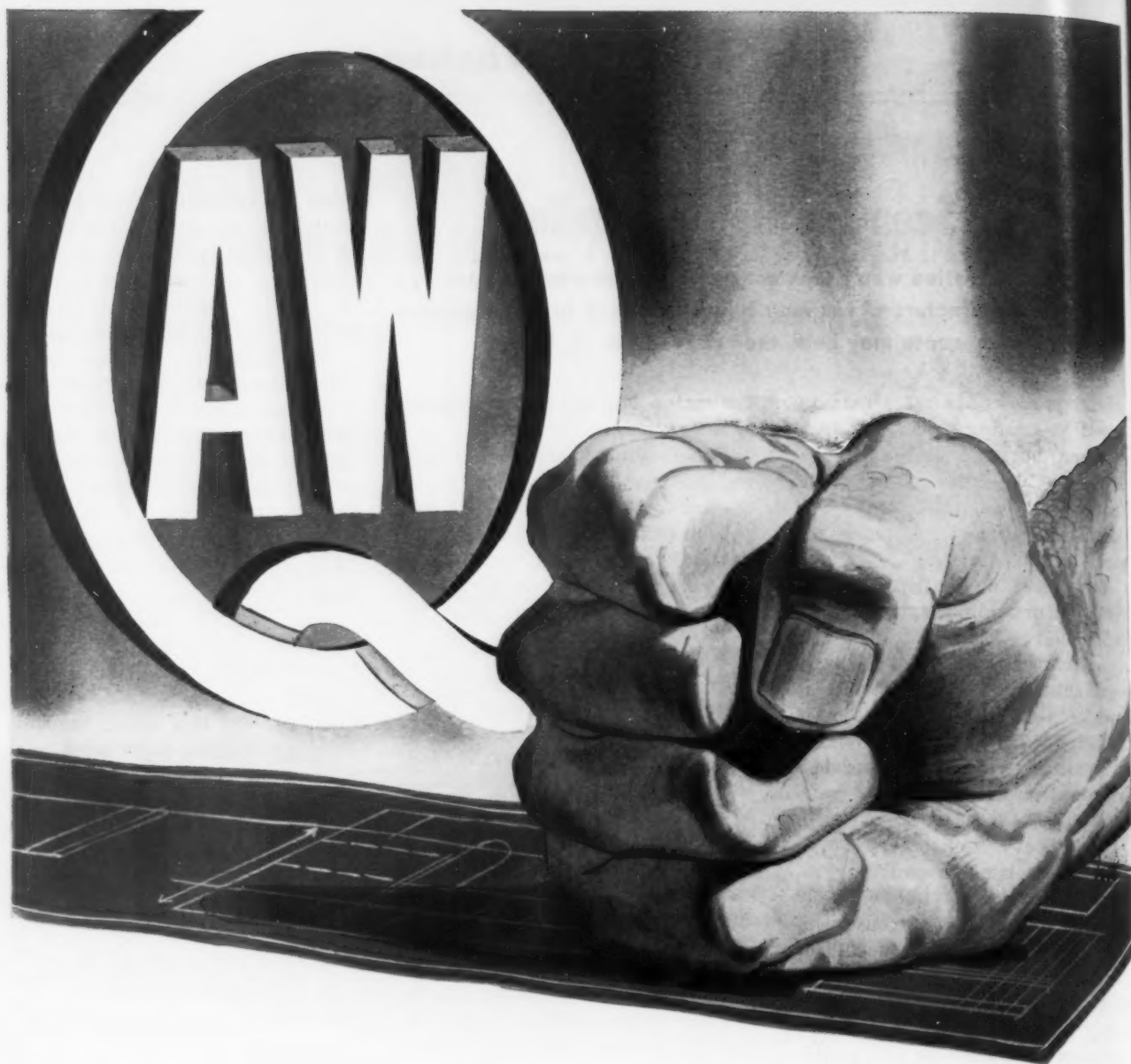
Mr. Shafer (in a recent speech to the Manufacturing Chemists Association) charges that some Senate Democrats who want to keep the government in competition with private industry succeeded in writing "unreasonable requirements" in the rubber plant disposal law that was put into effect last summer.

An increased demand for rubber in the future may well result in the building of new and more efficient synthetic plants by private industry. In this event, the government will find itself stuck with "the greatest white elephants in history"—28 unwanted and obsolete rubber plants that cost the taxpayers \$700 million to build.

Alkylate Use Freed . . . Government ban on the use of scarce alkylate in automobile gasoline has been suspended until Jan. 1. The prohibition was lifted on October 1 because production of aviation gasoline is exceeding anticipated output, and also because difficulties in obtaining steel plate for new storage tanks are being encountered by the oil industry.



ACTING QUICKLY, President Eisenhower last week started Taft-Hartley machinery in motion to get an injunction called against the ILA dockworker strike.



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• Out in our shop A.W.Q. is the symbol of American Welding Quality. It is serious business to 800 craftsmen who make your welded product their personal concern.

A.W.Q. is a constant reminder to these men, skilled in the art of forming, welding and machining, that you expect every ring, every band, every assembly to be handled with the same care exercised in your own plant.

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Loans:

Treasury Secretary, SBA take over loan duties from RFC.

Treasury Secretary Humphrey now has responsibility for defense loan functions formerly handled by the old Reconstruction Finance Corp.

By order of President Eisenhower, Mr. Humphrey will make loans and loan guarantees needed by private firms to expand capacity, develop production methods, and produce essential materials. Decisions of the Treasury chief are to be guided by certificates of necessity issued by Office of Defense Mobilization.

Foreign Loans Not Included

The change of responsibility applies only to the domestic side of defense production. Export-Import Bank of Washington will continue to deal with loans for foreign expansion.

Direct loans made to applicants from its revolving fund will carry a 6-pct interest rate, Small Business Administration says after taking over government lending operations from RFC on Sept. 29.

When making participation loans—those in which private lenders originate the loan and SBA takes over part of the loan commitment—the private lender's rate will be charged. The minimum, however, is fixed at 5 pct, same as the old RFC rate.

Liquidate \$1 Billion

Reconstruction Finance Corp., scheduled for complete elimination by next June 30, still must liquidate assets amounting to about \$1 billion. RFC officials are looking over several plans to speed this.

RFC assets at the end of June totaled \$1.095 billion but some have been liquidated since that time. This included mortgages, bonds, acquired collateral, and several categories of loans—business, disaster, civil defense, and railroad.

Appraising the status of business loans last week, RFC Chief Kenton R. Cravens said: "Approximately 90 pct . . . are rated as good loans, representing no serious delinquencies or problems. They could be absorbed without loss by private interests."

When RFC lost its loan authority on Sept. 28, 75 loan applications were still unprocessed. Some of these were referred to Small Business Administration, while Treasury Dept. will handle certain others.

Industry Aid:

New agency opens for business—in more ways than one.

Pinpointing trouble spots in the economy became the number one task of the new-born Business and Defense Services Administration this week. Secretary of Commerce Sinclair Weeks, in announcing that the long awaited aid-to-industry service was open for business, sums up the principal goal of the new agency this way: "If business slows up, I hope the BDSA can help speed it up again."

In addition to providing what Mr. Weeks calls "a focal point for effective cooperation between government and business in promoting economic stability and growth," BDSA also takes over the enforce-

ment of the Defense Materials System plus administration of residual National Production Authority orders.

As Mr. Weeks envisages it, it is also a listening post and sounding board for bringing business facts and opinions to the direct attention of the government. In contrast to many earlier government aid-to-business agencies, it will be staffed at the top with many recognized leaders from industry who will work with—not under—government career officials.

Discrimination:

President's anti-bias group now complete, ready to go.

Membership in President Eisenhower's Committee on Government Contracts, established by executive order in mid-August, is now complete.

General Services Administration last week added its representative to the group, conceived as a means of examining alleged cases of employment discrimination by firms holding government contracts. Spokesman for GSA will be George B. McKibbin, Chicago attorney and chairman of the Illinois Public Aid Commission.

Comprising the committee, headed by Vice-President Nixon, are eight public members and representatives of six federal agencies—Atomic Energy Commission, GSA, and the Depts. of Commerce, Defense, Justice, and Labor.

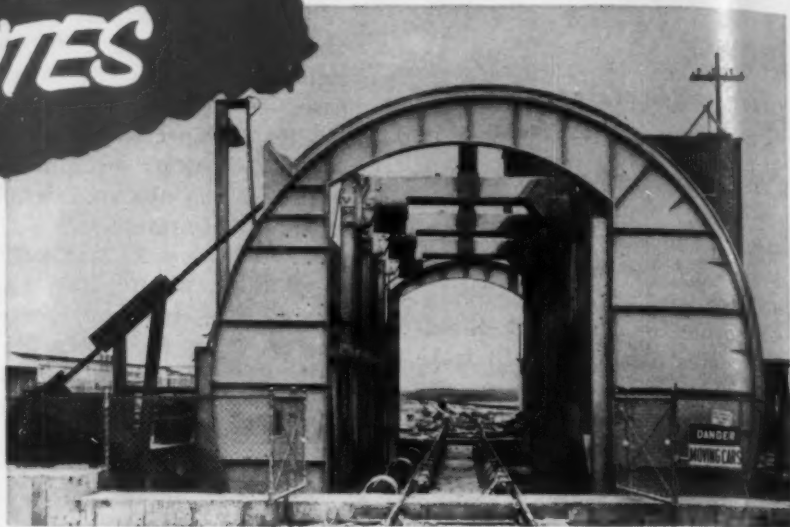
Mr. Nixon said when the committee first met with President Eisenhower that the members believed its work would have more impact if it were carried to the nation. For this reason, the group will move about the country for its meetings, giving special attention to those areas from which it receives complaints of biased hiring practices.

"The President," Mr. Nixon commented, "has insisted on something concrete from us in the government contract field, rather than a great show from a publicity standpoint."



All in a matter of
2 MINUTES

Another 90 tons of
coal unloaded by the
Heyl & Patterson
Rotary Car Dumper
...at Fairless Works



At the Fairless Works of the United States Steel Corporation, all rail shipments of coal, ore and limestone head directly for the new Heyl & Patterson 30 cars-per-hour Rotary Car Dumper. Here a 90-ton capacity railroad car is pushed onto the dumper, overturned to unload the contents, returned to an upright position and pushed off the dumper . . . all in a matter of two minutes.

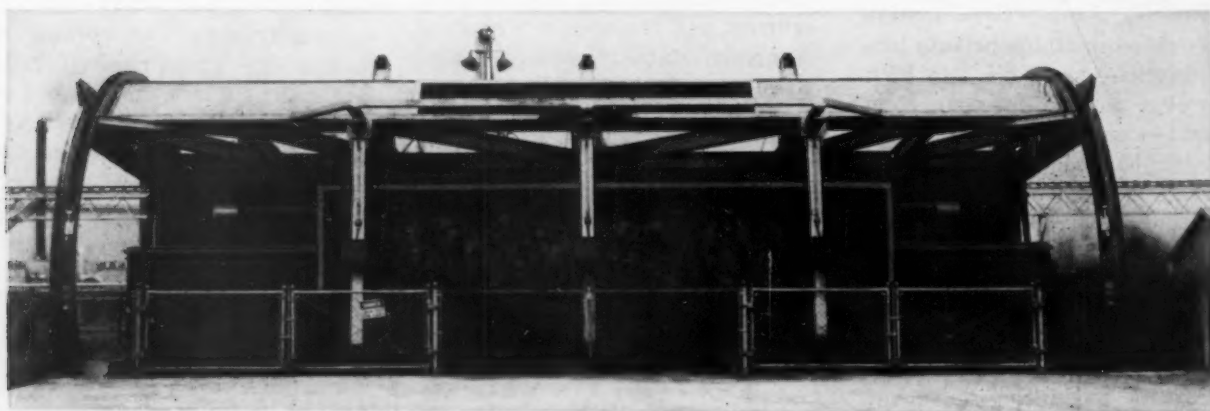
The Rotary Dumper at Fairless Works features a self-contained clamp-setting mechanism located on the dumper structure proper. This more compact installation eliminates the need of separate counterweight structures.

Cars can be spotted perfectly by the operator on

this Heyl & Patterson Dumper through the use of air-operated car retarders, eliminating the necessity of personnel entering the dumper structure.

If the problem at your plant is unloading large quantities of coal, ore or any Heavy Bulk Material quickly and economically . . . investigate the many engineering, operating and maintenance advantages of Heyl & Patterson Rotary Car Dumpers.

When your problem concerns the loading, unloading, transferring, stocking or conveying of any Heavy Bulk Material . . . remember the Engineering, Fabrication and Erection facilities of Heyl & Patterson. These facilities enable Heyl & Patterson to take complete responsibility for the entire job.



Heavy Bulk Materials Handling Equipment All The Way from Design to Erection

High Lift-Turnover-Rotary
Railroad Car Dumpers
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Western Firms Design Atomic Aircraft

Lockheed joins Boeing and Convair in list of firms contracted to design nuclear-powered aircraft . . . Watch stream flow for power outlook through year—By T. M. Rohan.

Lockheed Aircraft Corp., Burbank, Calif., is now revealed as one of three plane producers holding Air Force contracts setting up a preliminary design study for a nuclear-powered aircraft.

Both Boeing Airplane Co., Seattle, and Convair, at San Diego, have undertaken similar projects for the Air Force. Their contracts were announced in the winter of 1951-52.

In addition, General Electric Co., and Pratt & Whitney are trying to develop nuclear-fission engines suitable for aircraft. It was assumed at one time that the GE engine was intended for Convair, while Pratt & Whitney has been working closely with Boeing.

Production Must Wait . . . Despite these efforts, there is no indication that Defense Secretary Wilson has changed his decision, announced last spring, that research on an atomic-engine plane could continue, but no actual aircraft would be assembled.

Any such plane built now, Mr. Wilson said, would be too heavy and slow for practical use, presumably because of the weight of material needed to shield the crew from radiation.

Check Water Levels . . . Northwest industries this week will keep an eagle eye out for the weekly Bonneville Power Administration stream flow report because the third week in October is the traditional indicator of water reserve for the remainder of the year. Early indications are for no power cuts but Kaiser's aluminum reduction plant last week alone had to pay \$89,000 additional power bill for supplementary steam generation while water is saved for possible later emergency. Currently about 10-20 pct of interruptible power or 20-

30,000 kw is on steam at about 7-9 mills per kw-hr compared to 2 mills for direct BPA customers.

Salvage Cryolite . . . The Mead plant is working a salvage operation in its own backyard through its cryolite recovery system. Since the plant was put in operation in 1941 by Alcoa for the Defense Plants Corp. and later taken over by Kaiser, a 19,600-ton pile of old cryolite-soaked pot linings has been accumulating.

These linings contain about 50 pct cryolite currently selling for \$280 per ton delivered in Spokane, up \$40 since Mar. 16. The recovery system reclaims this plus 40 pct alumina for \$100 less per ton or a saving of about \$20,000 per month.

How It's Done . . . Capacity of the recovery system is 500 tons per month and generation of new scrapped linings about 300 tons, leaving 200 tons per month capacity for work on the stockpile.

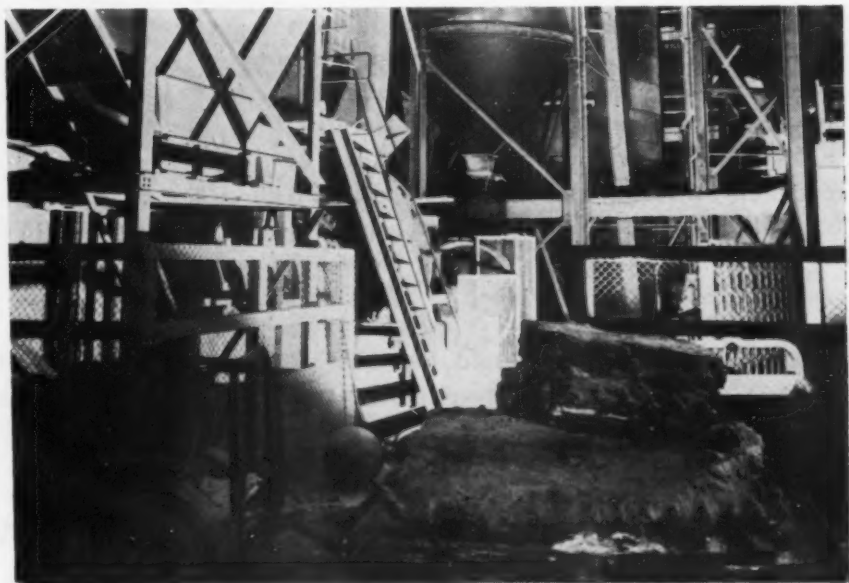
The old pot linings contain the electrolytic cryolite solution and alumina impregnated into carbon which must be burned off. Linings are smashed by gravity drop of a 3-ft steel ball, steel scrap is removed and the fragments placed in an Aerofill tumbling mill where they are pulverized.

Contains Some Iron . . . The powder is conveyed to the top of the 40-ft roaster where it is heated to about 700F as it falls through a series of ten grates.

Resulting mixture of cryolite and alumina is fed in with pure alumina going to the cells at about 60 lb per 5000 lb of alumina.

The roaster was developed in conjunction with Nichols Engineering of New York. Another installation of its type is at Alcoa, Tenn., and Reynolds is reportedly working on a system for its Longview, Wash., reduction plant. The Aluminum Co. of Canada uses more expensive leaching process for recovery which results in higher purity.

Only known commercial source of native cryolite is in Greenland, although it is manufactured synthetically at about the same price by Alcoa and Reynolds and is in increasingly higher demand.



OLD ALUMINUM potlines are hauled to cryolite recovery plant of Kaiser Aluminum's installation at Mead, Wash. Cryolite is recovered for about \$180 per ton.

HANDLE ALL YOUR EMULSIFYING CUTTING OIL NEEDS with S.E.C.O. and S.E.C.O. HD "F"

Sunoco Emulsifying Cutting Oil — For general-purpose cutting and grinding.

This product is more widely used in metal-working plants than any similar oil. It has high emulsion stability and cooling efficiency, excellent lubricating and rustproofing characteristics. Those features, plus low initial cost, make S.E.C.O. ideal for a wide range of machining, grinding and rolling operations on both ferrous and nonferrous metals.

Sunoco Emulsifying Cutting Oil HD "F" — For heavy duty cutting.

Its extreme pressure properties give it a film strength more than twice that of regular emulsifying oils. This high film strength, plus increased "oiliness" characteristics, makes it ideal for machining jobs too tough for regular soluble oils and too hot for straight cutting oils. Emulsions of S.E.C.O. HD "F" are clean smelling and will remain so in service.

For complete data on S.E.C.O. and S.E.C.O. HD "F," call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. IA-10.

**INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY**

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Machine Tool High Spots

Wage-Price Spiral Favors Machine Use

Government statistics show wages up 157 pct since 1939 . . . Machinery prices up only 75 pct . . . This throws heavier emphasis on machine use by industry—By E. J. Egan, Jr.

Good, sound reasons for buying new machine tools are always of interest to machine tool builders and their customers and prospects. One good reason, and an impartial one, comes to light from an analysis of price and wage indexes for the machinery and equipment industries of the U. S.

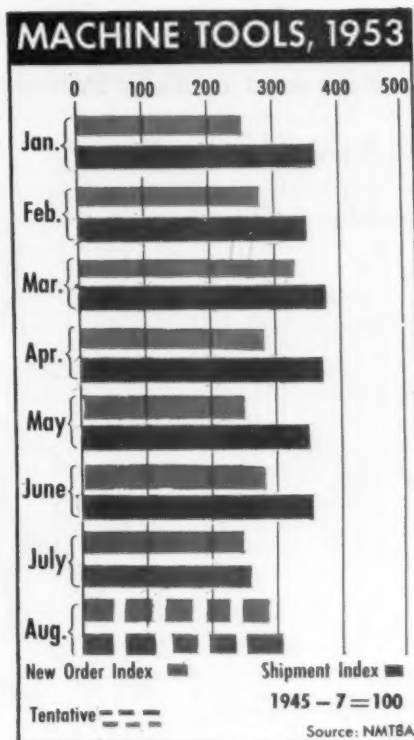
Figures compiled by the Bureau of Labor Statistics show that wages in these industries increased 157 pct during the period from 1939 to July, 1953. At the same time, machinery and equipment prices rose only 75 pct.

Favors Machines . . . In comparing these indexes, a recent bulletin of the Machinery and Allied Products Institute draws a significant conclusion: "The much smaller rise of machinery and equipment prices relative to the increase in wages paid by industry creates a cost differential which becomes a powerful stimulus to employ labor saving equipment."

Proof that machinery builders and many of their customers agree with this conclusion lies in a study of productivity for the nation as a whole during the period 1939-53. To begin with, take another look at machinery and equipment wages (up 157 pct) and at prices (up only 75 pct).

Productivity a Factor . . . Undeniably, wages have exerted considerable pressure on prices, but the exact degree cannot be measured by a simple comparison of wage and price increases. Gains in "productivity," expressed in terms of lower labor requirements per unit of product, have undoubtedly eased much of the pressure of rising labor costs.

Very important is the fact that in the capital goods industries at the present time, the total wage bill is almost exactly the same percentage of sales that it was in 1939. In order to maintain this ratio while average hourly earnings rose 157 pct and prices only 75 pct, an increase in overall productivity of about 2.75 pct per year, compounded annually, was necessary. This gain has con-



tributed greatly to the 2 pct long-term annual rate of increase in productivity for the nation at large.

Good Record . . . Productivity gains shown by capital goods manufacturers are direct results of the rapid rate of investment by machinery producers and the in-

creased utilization of machinery manufacturing capacity since 1939.

In addition, the record of the capital goods firms in raising productivity while holding down their prices is a testimonial to their competitive spirit.

It indicates that this industrial group, heavily studded with small and medium size firms, can maintain a rapid rate of advance in technology, and at the same time preserve the spirit of competition and creative enterprise.

Open New Building . . . Thirty-four machine tools, produced by 22 builders and valued at approximately \$200,000, were demonstrated before hundreds of visitors at a recent week-long exhibition and grand opening of a new building for machine tool distributors, Harrington-Wilson-Brown Co., Mt. Vernon, N. Y.

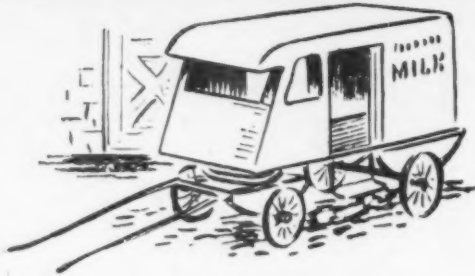
Air-conditioned and completely modern and functional in every respect, the two-story concrete brick and steel structure was completed at a cost of approximately \$300,000. The distributor's offices and a 40x65-ft machine tool showroom occupy the main floor, and second floor office space is rented to other tenants. A large parking lot adjoins the building.

Permanent Exhibition . . . The machine tool showroom exhibit will be a permanent feature. All equipment on display will be fully powered for demonstration purposes. Incoming and outgoing shipments of machinery will be aided by a hydraulic lift platform built into the showroom floor which can be raised to truck bed height for easy loading and unloading.

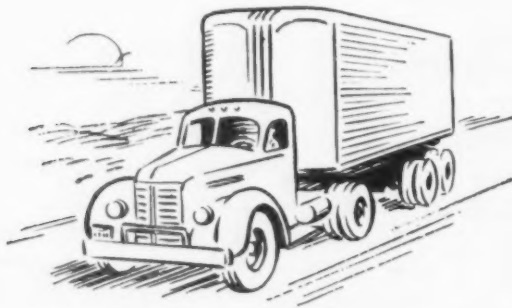
A conference room has been equipped to show slide films and motion pictures. An advertising department, and separate stockrooms to carry inventories of replacement parts and manufacturer's catalog are added features of the firm's new headquarters.

King FIFTH WHEEL COMPANY'S

50th Anniversary



1904 to 1954 . . . years which have embraced wars, depressions, talkies, radio, TV and now 3-D! Success and failures, revivals of old ideas, creations of new; hirings, firings, labor contracts, re-openings, all-color markets . . . These have been an exciting 50 years . . . To begin our celebration we of King are staking out a claim at the National Metal Exposition. You are most cordially invited to visit with us to reminisce, to forecast or just plain relax. Lord knows we'll need rest before we start on another half century!



We'll be looking for you!

Make BOOTH No. 516
YOUR HEADQUARTERS
at the National Metal Exposition
Cleveland, October 19-23



King

FIFTH WHEEL COMPANY

2915 NORTH 2ND STREET, PHILADELPHIA 33, PA.

REPORT TO MANAGEMENT...

Durables have lower resistance

If you are making durable goods for industry and consumer you will have a slightly lower resistance to production ills arising in the incipient boom adjustment period. Don't consider this higher susceptibility as sickness. It is instead the major symptom of a return to less boom, a more normal market. Durable goods have been tagged with much of the blame for the downtrend of Federal Reserve Board's September output index--from 238 in August to 234.

Must do most of adjusting

Profiting most from boomtime's lofty buying, industrial expansion, durable goods must likewise do most of the adjusting. In years of more placid markets, sales of nondurable goods exceeded durables by roughly 3 to 2. With the past decade's substantial spurt of spending, and industry growth, the ratio was progressively slimmed. A first for peacetime, manufacturers' sales of durables this year held a thin edge over nondurables. Only in 1944 did this happen--because of war's emphasis on durables.

Will hold most ground gained

With a dip in defense spending and expansion, durables must inevitably gravitate nearer to normal. But the old ratio is scrapped forever. Spending is rooted on such a high plateau and industry's so heavily committed to continuing modernization that durables will hold most ground gained despite the easing.

Durable-nondurables gap narrows

In 1939, monthly average of durables manufacturers' sales was \$1.9 billion to \$3.2 billion for nondurables. In 1940, \$2.4 billion to \$3.5 billion. When 1941 disposable personal income surged to \$92 billion from 1940's \$75.7 billion, the ratio began to narrow. Briefly after World War II it widened but after that grew ribbon-thin. Character of the American market has changed irrevocably, barring an unlikely depression. In 1951 durables accounted for monthly average sales of \$10.5 billion, nondurables, \$11.7 billion. In 1952 durables were \$11 billion, nondurables under \$12 billion. High tide of the boom floated durables in '53 above nondurables, making the July rate \$13.4 billion for durables and \$13.3 for nondurables.

What goes up must come down

For durables we can modify a law of physics to "what goes up must temporarily come down part of the way." And durable goods have registered outstanding sales advances since 1948--about 95 pct and better for such major industries as primary metals, fabricated metal products, electrical machinery, non-electrical machinery, motor vehicles. Up a precipice went motor vehicles and equipment with a 98 pct gain since '48. Across the board, the disproportionate peaks of durables industries must erode somewhat, are doing so now.


Sales gains registered

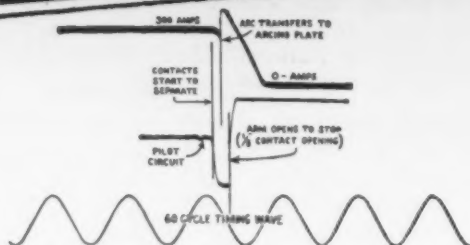
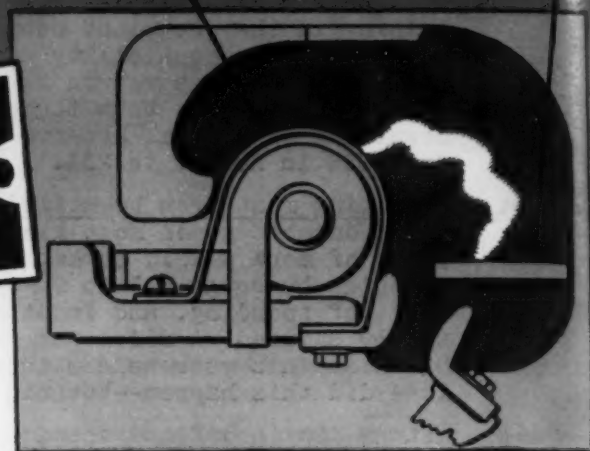
Adjusted monthly average of motor vehicle sales in '48 were \$1.13 billion and last July stood at \$2.25 billion. Primary metals sales rose from \$1.4 billion to \$2.35 billion; fabricated metal products, \$850 million to \$1.54 billion; electrical machinery, \$740 million to \$1.37 billion; non-electrical machinery, \$1.3 billion to over \$2 billion.

Higher stake in prosperity

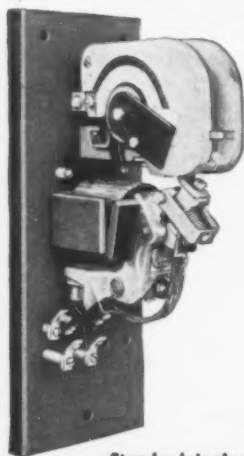
On another sales front, consumer durables tend to trail nondurables in grabbing a share of boom demands--though both gain enormously. In 1929 consumer durables took 12 pct of personal consumption expenditures, nondurables 47.9 pct, and services 40.2. As of June 1953, the ratio changed to 13.3 pct for durables, 53 pct for nondurables, while services slipped to 33.7. Since only a limited fraction of the consumer's dollar can go to services, any high income period surplus is diverted to products. During hard times, however, durables weaken more than the other two categories and as result have a larger stake in continuing prosperity.

Quick Arc Transfer

from tips  to blowout guard and arcing plate
in $\frac{1}{500}$ th second



As the contacts start to separate, the arc is removed in $\frac{1}{500}$ th second. The oscillogram at the left shows this clearly.



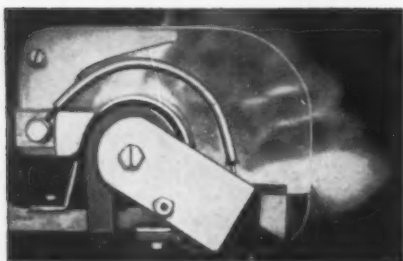
Standard single-pole
LINE-ARC Contactor.

Keeps Contacts COOL for LONG Life

In EC&M LINE-ARC Contactors, the arc leaves the contacts quickly . . . and keeps moving in a line, centered between but not touching the arc shields. One end of the arc travels along the arcing-plate and the other end along the circular guard over the blowout coil.

In repetitive operation, the copper contacts remain cool. This low operating temperature keeps the copper hard and greatly extends the life of the tips.

EC&M LINE-ARC Contactors have a reputation for high performance. Ask our nearby office to explain the advantages of these popular contactor controllers for cranes, mill drives and material handling machines.



100-ampere contactor with special glass arc shields ruptures 300-ampere load. This convincing demonstration has been witnessed by hundreds of visitors at the EC&M Factory.

No Destructive Arc Shield Burning

An a-c bucket crane has handled over one million tons of fertilizer with minimum upkeep on EC&M LINE-ARC Contactor Control. In seven years, three arc shields were accidentally broken, but none have been replaced due to burning. Contacts on one size contactor have been replaced on an average of once a year, the next size every two to three years, and no replacements on the largest size. It pays to specify EC&M Control.

SEND FOR BULLETIN 1145

THE ELECTRIC CONTROLLER & MFG. CO.
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Contact **KAYDON** of Muskegon

FOR ALL TYPES OF BALL AND ROLLER BEARINGS: 4" BORE TO 120" OUTSIDE DIAMETER



BI-ANGULAR BEARING
PERSPECTIVE ILLUSTRATION

CENTER POINT

Here's a bearing that can be "custom-engineered" to your exact requirements

KAYDON BI-ANGULAR Roller Bearings are adaptable to various proportions of thrust and radial loads

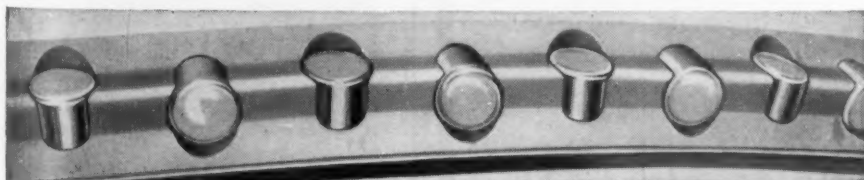
If you've design problems involving various combinations of thrust and radial loads, you don't have to buy separate radial bearings and separate thrust bearings.

KAYDON BI-ANGULAR Roller Bearings normally are built with every other roller reversed, and in such cases, adjacent rollers are at 90° to

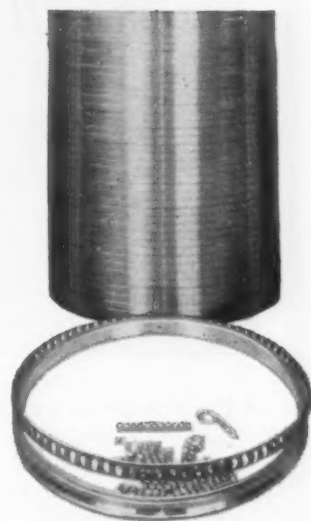
each other to carry both thrust and radial loads.

To handle thrust loads greater from one direction than the other, the bearing can be made with every second, third or fourth roller reversed, depending on the load inequality.

Whatever your bearing needs, KAYDON has all the facilities your engineers require. Whether it's only a few or many special bearings — 4" to 120" outside diameter — or millions of high-precision rollers — contact KAYDON for confidential counsel and cooperation.



Close-up shows alternate rollers reversed. KAYDON BI-ANGULAR Roller Bearings are particularly suitable for low-speed applications involving heavy impact loads.



31.000" x 34.988" x 2.000" KAYDON BI-ANGULAR Roller Bearings have been produced in large quantities and are successfully in use. They are further proof of KAYDON ability to design and make unusually large precision bearings for specific needs.

THE KAYDON ENGINEERING CORP.

MUSKEGON • MICHIGAN

PRECISION BALL AND ROLLER BEARINGS

KAYDON Types of Standard and Special Bearings:
Spherical Roller • Taper Roller • Ball Radial • Ball Thrust
• Roller Radial • Roller Thrust • Bi-Angular Bearings

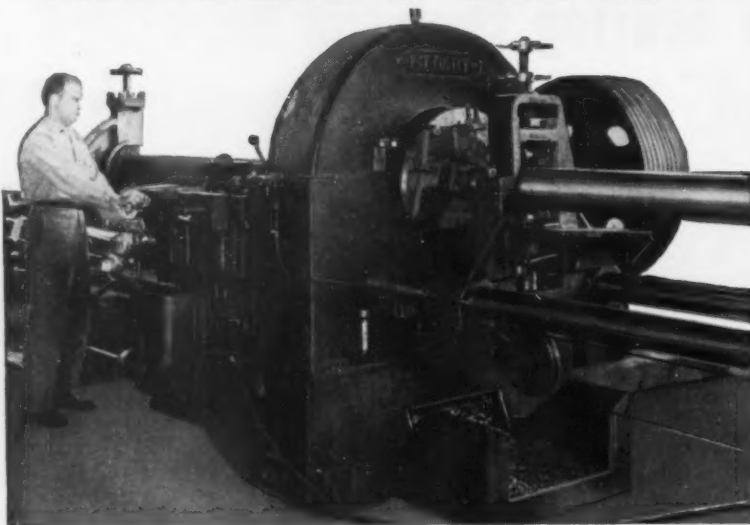
Fully Automatic Centerless Turning & Peeling!

... for bars and tubes from
1" to 9" diameter, and larger



MODEL RFRG

CENTERLESS TURNER



- For high production superior finish, close-tolerance turning or rough peeling. Workpiece size and throughput speeds are limited only by capacity of cutting tools.
- New direct-drive roll-feed with patented Universal Centering Device insures continuous, positive feed and automatic centering of workpiece in cutterhead.
- Separate variable drives for feed and cutterhead give exact ratios between cutter speeds and bar feeds.
- Either 1 or 2 removable cutterheads may be used, with from 1 to 10 cutters for maximum cutting flexibility. Either carbide or high-speed tools are used.
- Eliminates time lost in loading and unloading. Automatic input and output grip carriages permit constant end-to-end feed and delivery.
- Fully automatic push button control from central operating station.

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Free Publications

Continued

Lubrication

Lubri-bond is a dry film lubricating compound specifically designed to meet industry's antifriction requirements. The product combines various lubricating pigments with a special binder to insure an effective frictionless coating over surfaces exposed to wear from mating surfaces. Lubri-bond comes in spray and brush types and is said to adhere to iron, steel, aluminum, copper, brass, alloys, plastics, wood and cork. Complete details are in a new booklet. *Electrofilm Corp.*

For free copy circle No. 13 on postcard, p. 231.

Dust control

How dust can be controlled in metalworking industries is discussed in a bulletin published by American Wheelabrator & Equipment Corp. Particular emphasis is given to use of cloth-tube-type dust collectors in the ventilation of grinding and annealing operations, sprue mills and blast cleaning equipment. A section is also devoted to cloth filtration in hot operations such as collection of foundry cupola fumes. *American Wheelabrator Equipment Corp.*

For free copy circle No. 14 on postcard, p. 231.

Freight car flooring

Descriptive data and engineering and application information on Nailable Steel Flooring for use in gondolas and box cars is contained in a new 6-p. illustrated booklet. Flooring is designed to keep cars in revenue service, lower maintenance and repair time and expense. Illustrations show completed installations. *Great Lakes Steel Corp.*

For free copy circle No. 15 on postcard, p. 231.

Gages, instruments

New price list of SR-4 strain gages, instruments and accessories has been issued by Baldwin-Lima-Hamilton Corp. Specifications for 105 sizes and types of gages are tabulated. *Baldwin-Lima-Hamilton Corp.*

For free copy circle No. 16 on postcard, p. 231.

Turn to Page 261

HOW

WHEELABRATOR[®]
STEEL SHOT

Strikes at the **HEART** of Your
Cleaning Cost Reduction Problem

LESS ABRASIVE CONSUMPTION

General Heat Treating Co., Syracuse, N. Y., is able to clean 217 lbs. of heat treat work for every pound of Wheelabrator Steel Shot consumed, compared to only 34 lb. of work cleaned per lb. of malleableized grit formerly used.

INCREASED PARTS LIFE

At a progressive Eastern Steel Foundry the use of Wheelabrator Steel Shot resulted in a 150% increase in blade life with corresponding increase in the usable life of other machine parts.

LOWER CLEANING COSTS

A large New York grey iron foundry slashed abrasive costs for \$2.49 per hour to \$1.54—a 38% reduction . . . when they switched from chilled iron grit to Wheelabrator Steel Shot.

LESS MAINTENANCE LABOR

Due to the 300% increase in machine parts life resulting from the use of Wheelabrator Steel Shot, maintenance labor costs were slashed at a prominent Eastern Plant.

**Another
American
FIRST**

50 LB. CARTONS and PALLETIZING

For Safety—Convenience—and Lower Cost to You

Wheelabrator Steel Shot is now packaged in strong, easy to handle 50 lb. cartons—more rugged and durable than antiquated burlap bags (100 lbs.). Shipments of 1 ton or more are securely strapped to expendable pallets (40 cartons to a pallet) for safer transportation and easier handling and storage. *All at no extra cost!* Another "plus" for Wheelabrator Steel Shot—the modern blasting abrasive.

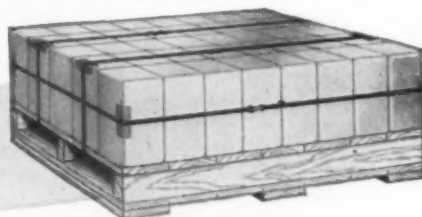


Easy-to-carry, easy-to-pour, this new carton reduces strain and fatigue in abrasive handling.

50 lb. carton



A Palletized 1-Ton Shipment



WRITE FOR BULLETIN No. 89



American

WHEELABRATOR & EQUIPMENT CORP.
510 S. Byrkit St., Mishawaka, Indiana

NEW EQUIPMENT

New and improved production ideas, equipment services and methods described here offer production economies . . . just fill in and mail the postcard on page 239 or 240.

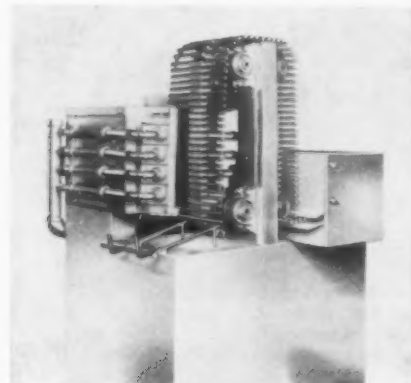


Resistance welders for large production runs

A new line of resistance welding machines is designed specifically for commercial applications requiring large production runs of high quality welds. Included in the line is the EPT 2 machine, one of a series of three-phase projection welders available in 50, 75 and 100 kva at 50 pct duty cycle and having throat depths of 12, 18 and 24 in. and maximum electrode force of 4000 lb. It can be supplied as a combination projection and spot welder to make high quality spot

welds on large production runs on two thicknesses of clean mild steel in minimum gages of 0.020 in. and maximum gages of 0.203 in.; stainless steel in minimum gages of 0.022 in. and maximum gages of 0.125 in.; aluminum and other light alloys (to commercial standards only), minimum gages of 0.025 in. and maximum gages of 0.102 in. Other materials and alloys such as brass, coated steel, can also be welded. *Sciaky Bros., Inc.*

For more data circle No. 24 on postcard, p. 233.



End heating unit rated at 900 rods per hour

Using production figures based on heating a 4-in. end-section of $\frac{1}{2}$ in. rod, the new Hot Rod end heating unit is said to bring rod to 1900°F in 50 sec, with an hourly production of 900 rods on the model illustrated. A $\frac{3}{4}$ in. rod reaches the same temperature in 75 sec with hourly production of 600 rods. Designed with conveyor and automatic hopper feed, it is said to handle stock sizes of rod from $\frac{1}{4}$

to $1\frac{1}{2}$ in. diam with varying number of burners to satisfy the particular stock and production to be handled. Length of section heated may be up to 4 in., and overall length of pieces 6 to 24 in. The manufacturer states that this Hot Rod unit is suited for rod end heating—upsetting, bolt heading, swaging, localized hardening, etc. *Gas Appliance Service, Inc.*

For more data circle No. 25 on postcard, p. 239.



Honing machine improves metal parts finish

Hydraulic honing machine offers improved process for the liquid-abrasive cleaning and polishing of all metal parts. Design changes incorporated make it possible to increase finish appearance and accuracy, speed production, and decrease upkeep costs. An automatic drain promises a 300 pct faster changeover from one abrasive to another. Operators are assured exceptional blast chamber visibility through an increase in illumination

to 1200w brilliance, and a new blower system completely changes interior air every 3 sec. A special time-consuming pump packing contamination problem has been overcome by a special pump that eliminates the packings entirely and also allows the abrasive carrying fluid to by-pass all bearings. Operator fatigue is lessened by comfortable foot controls. *Hydro-Hone Mfg. Co.*

For more data circle No. 26 on postcard, p. 239.

Turn to Page 246



VISIT BOOTH 221, at the Metal Show

In operation, the General Motors ALDIP process for aluminizing steel products; also the new Schaeber Dilatometer for measuring the transformation of austenite in salt baths . . . PLUS a documented display of production parts from salt bath heat treating installations.

Say Goodbye to Guesswork

ON HEAT TREATING RESULTS AND COSTS!

Without charge or obligation, the Ajax Metallurgical Service Laboratory will treat specimen parts by any of the following processes:

ALUMINIZING
CARBURIZING
CYANIDE HARDENING
NEUTRAL HARDENING
ANNEALING OR HARDENING
STAINLESS STEEL
BRAZING
HARDENING HIGH SPEED
STEEL
AUSTEMPERING
MARTEMPERING
PROCESS ANNEALING
CYCLIC ANNEALING
SOLUTION HEAT
TREATMENT
DRAWING (Tempering)
DESCALING, CLEANING
DESANDING

What about the quality of the finished work? Will it be scale-free, devoid of decarb? Will the heat treatment prevent distortion and thereby reduce or eliminate costly grinding or finish machining operations? How much production will the furnace give per hour, and what floor space will be needed? What will the power, labor, maintenance and other heat treating costs amount to? In short, will your proposed new furnace live up to the manufacturer's enthusiastic claims for it?

You can be absolutely sure on all of these points before you buy an Ajax Electric Salt Bath Furnace for these reasons:

1—No Ajax salt bath furnace is ever sold until Ajax engineers—backed with experience in over 4,000 installations—are convinced it will do the job to your entire satisfaction as well as to theirs.

2—Before buying, we strongly urge that you utilize the facilities of the full commercial scale Ajax Metallurgical Service Laboratory. Send or bring batch lots of your materials for heat treating under actual working conditions. Let us prove beyond any question of doubt what can be done, how it can be done, and under exactly what conditions.

3—Once your furnace is installed, an Ajax engineer will visit your plant to double check, to instruct, and to make sure that on-the-job operation fully matches our expectations.

This policy has resulted in the most outstanding patronage ever accorded any heat treating furnace, both in the importance and number of users. A list of users is available on request. The high percentage of customers who have re-ordered Ajax heat treating equipment is unparalleled in the furnace industry.

AJAX ELECTRIC COMPANY, Inc.

World's Largest Manufacturer of Electric Heat Treating Furnaces Exclusively

904 Frankford Ave.

Philadelphia 23, Pa.

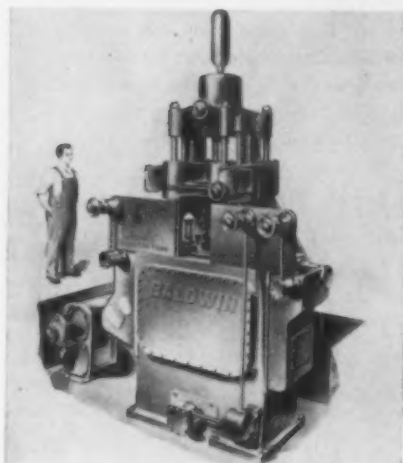


AJAX

ELECTRIC SALT BATH FURNACES

New Equipment

Continued

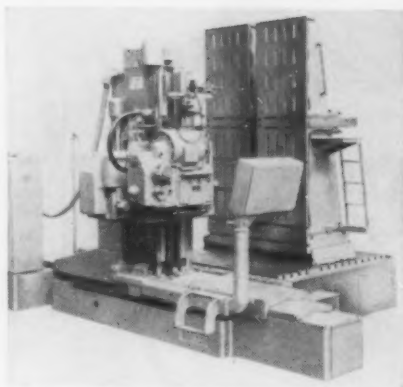


Press for compacting powdered metals

Model C compacting press is a mechanical, four-column, crank-type press equipped with a fly-wheel, pneumatic clutch and pneumatic brake. Operation is by a variable speed-drive unit with a 20-hp, totally enclosed motor. The entire press mechanism is enclosed and sealed to prevent entrance of abrasive materials, making it suitable for compacting powdered metal as well as pressing ceramic parts and grinding wheels. Accurate compressing pressure is assured

through the use of a hydraulic head whose ram supplies opposing pressure for the upper punch. Floating die holder and core rod, able to float independently of each other, are held in their normal top position by air cylinders. Positive stops, adjustable by handwheels, control the distance of float. Depth of fill and the stroke of the bottom punch are adjustable. The press uses a shuttle type feeder. *Baldwin-Lima-Hamilton Corp.*

For more data circle No. 27 on postcard, p. 228.



New Keller is smaller in size and capacity

A medium size Keller machine, the BG-21, has been specifically designed for electric tracer control, but can also be used as a regular milling machine. Kellering with the BG-21 can be done in two ways: By following a sheet metal template or side walls of a model with a profiling tracer and cutting the duplicate shape with the side of an end mill; or by using a 3-dimen-

sional tracer to follow a full model in a series of parallel passes with the spacing preset by the operator, thus duplicating the 3-dimensional shape. P & W Keller machines permit quick conversion from one type of control to the other. Five different sizes range from 4 x 2½ ft up to 10 x 4 ft, plus special two-spindle models. *Pratt & Whitney.*

For more data circle No. 28 on postcard, p. 228.

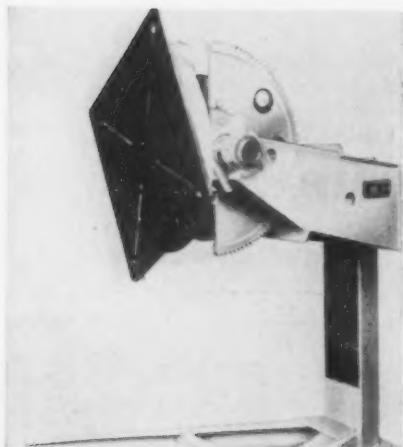


Metallizers feature temperature, texture control

Close temperature and spray texture control feature two new low temperature alloy metallizers. The alloy sprayers are electrically heated, self-contained units with high quality ni-chrome heating elements and extremely sensitive temperature controls. Air requirements are 3½ cu ft per min at 35 to 75 lb pressure. Both units can be

used for either intermittent or production spraying and incorporate the new integral crucible construction insuring the closest balance of thermal relationships between the thermostat, the heating elements and the heated mass. All parts are interchangeable. Alloys in billet, wire, rod or powder form can be used. *Forrester Co.*

For more data circle No. 29 on postcard, p. 228.



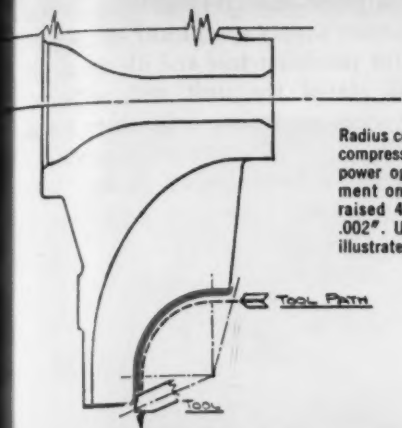
Positions for automatic or manual welding

Three new heavy-duty precision positioners for automatic or manual welding are built in 2500, 3000, and 6000 lb capacities. A special variable speed drive, of differential type with all components mounted on ball bearings, provides stepless speed change from zero to predetermined top speed. An accurately calibrated hand wheel or electric remote speed control is provided. The table is driven by a spur gear and pinion for minimum backlash

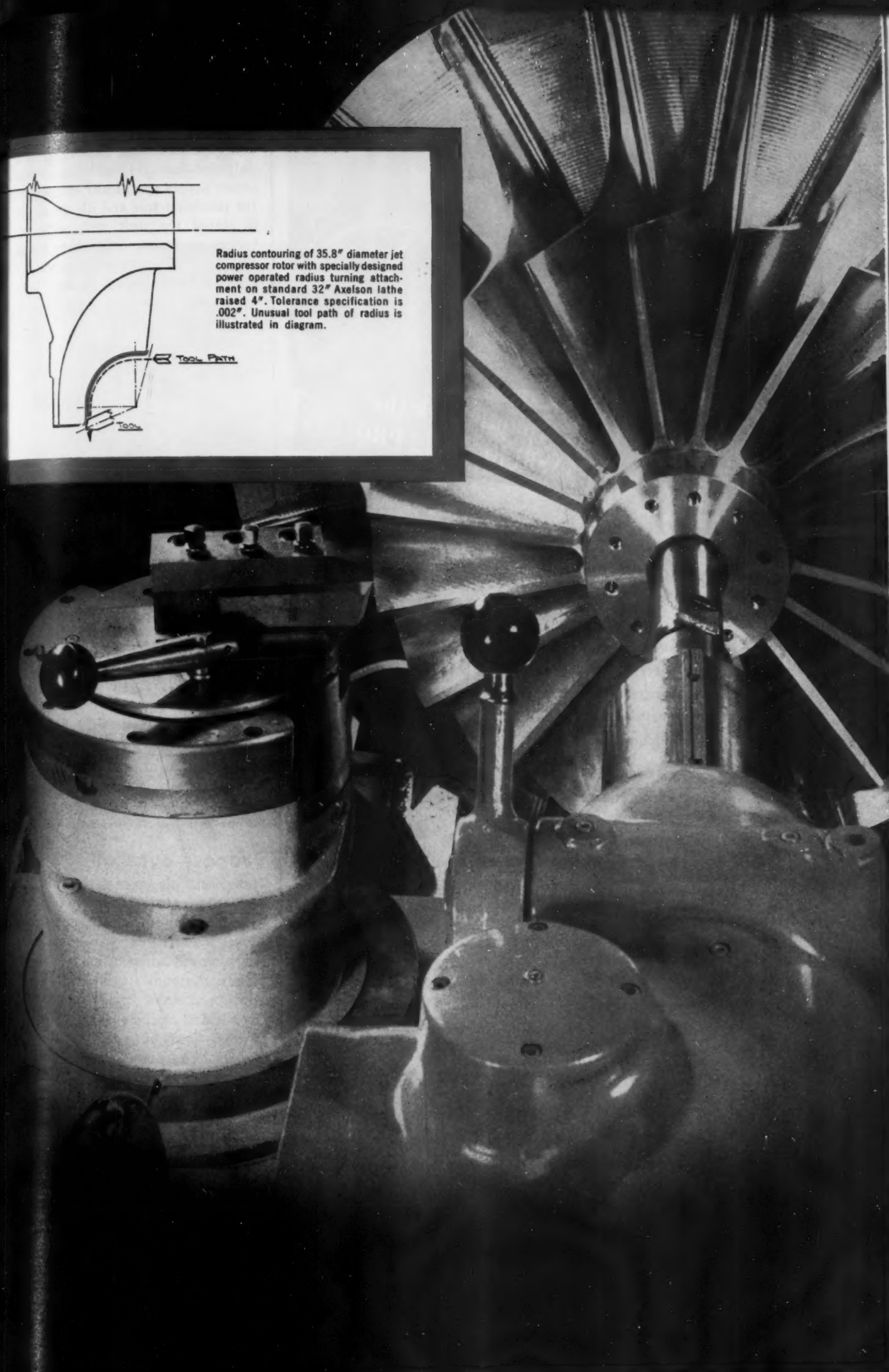
and accurate adjustment. A built-in high capacity ground gives resistance free return of the welding current which results in more uniform welds. Table tilting speed is 135° in 40 sec and table height is adjustable in 6-in. steps for handling various sizes of work most effectively. A tilt indicator is standard equipment for accurate location of pieces at best working angles. *Worthington Corp.*

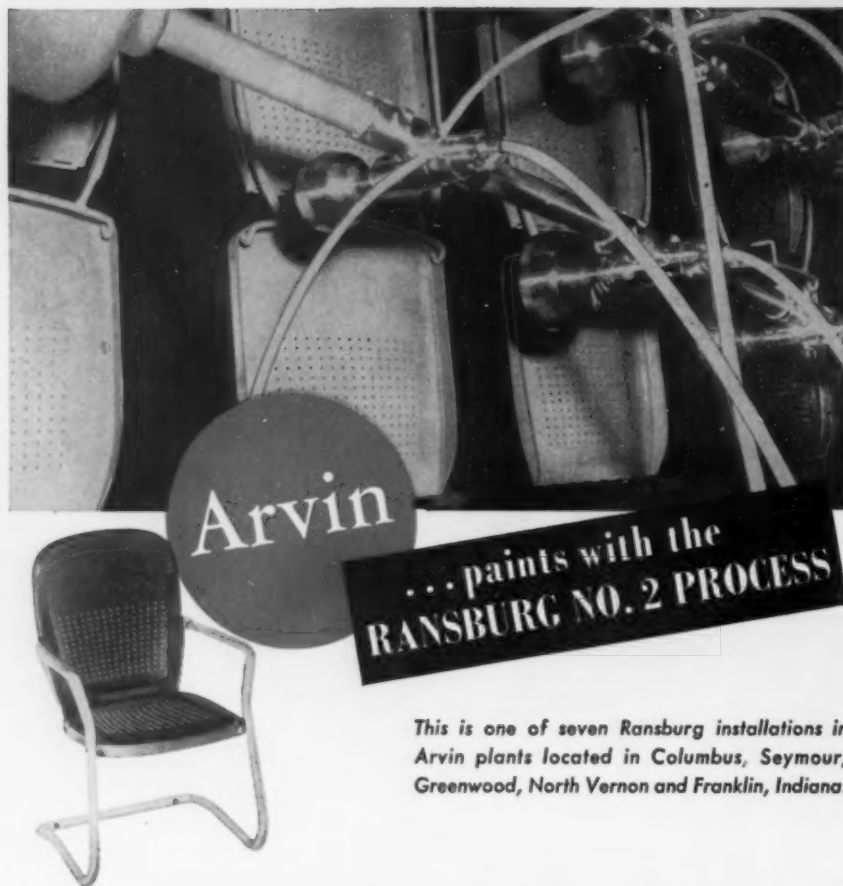
For more data circle No. 30 on postcard, p. 228.

Turn to Page 250



Radius contouring of 35.8" diameter jet compressor rotor with specially designed power operated radius turning attachment on standard 32" Axelson lathe raised 4". Tolerance specification is .002". Unusual tool path of radius is illustrated in diagram.





This is one of seven Ransburg installations in Arvin plants located in Columbus, Seymour, Greenwood, North Vernon and Franklin, Indiana.

When Arvin chair seats and chair backs were redesigned to be perforated with hundreds of little holes in each piece, the former dipping method of coating was unsatisfactory. Here are other reasons why RANSBURG NO. 2 PROCESS was selected to do the finishing job:

- ① Simplicity and rapidity with which colors may be changed without slowing production.
- ② Less floor space required.
- ③ Provides improved quality with no variance in the required 7/10 mil film thickness.
- ④ Former maintenance and clean-up time reduced to a minimum.

No savings in paint cost were anticipated. However, the RANSBURG NO. 2 PROCESS—in providing the above, desirable advantages—still enables Arvin to reduce finishing costs 10%. And, that over dip coat!

Want to know more about production efficiency of the NO. 2 PROCESS as it applies to YOUR production? Write for literature showing a variety of typical production installations in factories all over the country.



Ransburg

ELECTRO-COATING CORP.

INDIANAPOLIS 7, INDIANA

—New Equipment— Continued

Tool and die work

A new development in the field of electrical discharge machinery is a unit that features a completely new power supply specifically engineered for precision tool and die work. It is stated the unit will, with extreme accuracy, drill shaped and round holes in tungsten carbide and regular tool steels. It has been



used on die-sinking operations such as extrusion dies and cold header dies. Materials used in such cases were tungsten carbides. Because of the improved surface finishes, reduced machining time and tolerances obtainable with this machine, tool and die work costs can be reduced considerably. Tests have proved that carbide dies can be used in place of regular tool steel dies at substantial savings. *Eloz Corp.*

For more data circle No. 31 on postcard, p. 239.

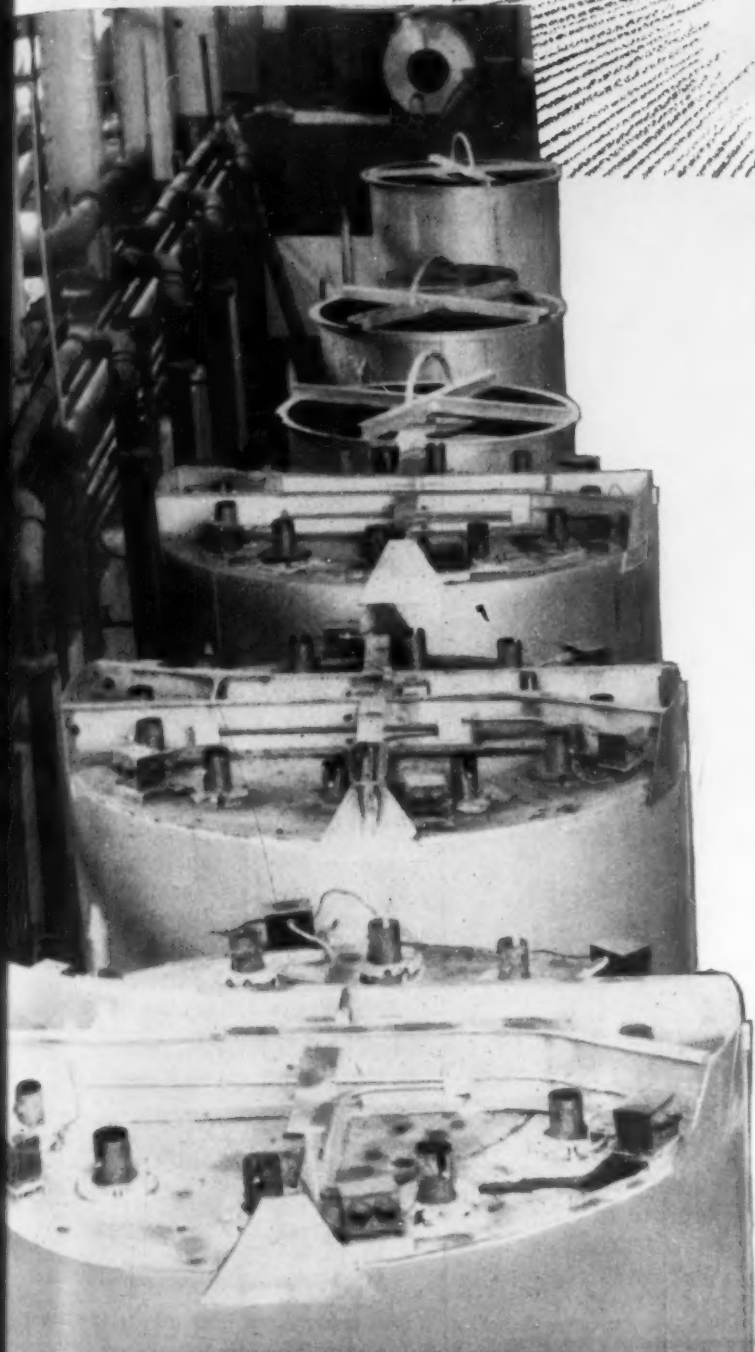
Process control

New electronic process control system eliminates distance factors, cuts time lag to a minimum, improves quality of control, and reduces capital investment. It is completely electronic, utilizing all the advantages and superiorities of electric and electronic transmission of measurement and operational signals. The manufacturer claims the system to be the most efficient means for measuring and controlling temperature, pressure, differential pressure, liquid level, and flow. Control components are completely standardized to permit interchange at the panel regardless of the type of variable under control. *Manning, Maxwell & Moore, Inc.*

For more data circle No. 32 on postcard, p. 239.

Turn Page

Annealing: Production Triples!



In this installation of three Lee Wilson radiant convector furnaces and eight bases with a charge size of 60" diameter and a piling height of 126", the tremendous efficiency of the Wilson radiant convector annealing system was demonstrated by increasing the yield from the same floor space by three times the original figure.

These units at Wallingford Steel Company at Wallingford, Connecticut are producing extremely uniform, high quality strip steel at an average production figure of 3800 tons per month. In a plant such as this where no additional space was available, this increase was achieved at a very nominal expense.



Lee Wilson

ENGINEERING Co., Inc.

2005 WEST LAKE ROAD • CLEVELAND, OHIO
Telephone ED-1-6600

BELL TYPE FURNACES ★ RADIANT TUBE HEATING ★ ANNEALING PROCESSES

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SERIES

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WE CAN TEST 'EM
..every which way!*



Regardless of shape or size of the casting, Unitcast has *complete* inspection facilities to assure you uniformly *sound* steel castings *every time*.

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- * Magnaglo... *particle inspection (or Zyglo).*
- * Gamma Ray or X-Ray... *we can "see through" your casting.*
- * Mechanical... *yes, we section-cut to check internal soundness.*

Whatever inspection method is needed on *your* steel castings, *we have it!* Another example of the *thorough quality control* you get at Unitcast.

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QUALITY STEEL CASTINGS

Our steel casting specialists welcome the opportunity of working with you on your parts problems... their suggestions at the design stage can pay you continuous dividends.

Write or call... Unitcast Corporation, Steel Casting Division, Toledo 9, Ohio; 701 New Center Bldg., Detroit, Michigan; In Canada: Canadian-Unitcast Steel, Ltd., Sherbrooke, Quebec.



UNITCASTINGS are

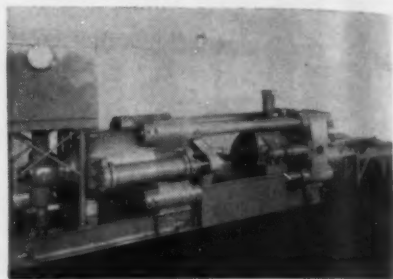
FOUNDRY ENGINEERED

—New Equipment—

Continued

Extrusion press

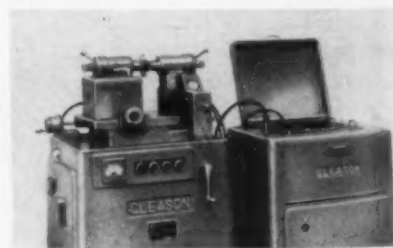
Compact size and fast cycling are features claimed for a new extrusion press. The butt shear is internally mounted and fully supported during the entire stroke with positive die positioning. The shear is supplied from the auxiliary high-pressure system. Double gate locks



give full bearing around the entire die slide. Other features include the mounting, which is completely assembled on an integral base ready for field connections, high-pressure clamping during the entire extrusion stroke to minimize flashing, and a fully accessible die slide for rapid die changes, including spider type hollow dies. *E. A. S. Co., Inc.*
For more data circle No. 33 on postcard, p. 239.

Spur gear tester

This No. 104 spur gear tester is used for testing running qualities, as well as tooth spacing and concentricity, of spur and helical gears. The machine will test fine-pitch gears up to 4½ in. center distance, such as those used in instrument



and control equipment. It is suited for testing hand-operated gears, fine-pitch gears which are to be run with a minimum of backlash, and also for gears that must operate at high speeds. Gears are tested by running with mating members, or mating master gears. *Gleason Works.*

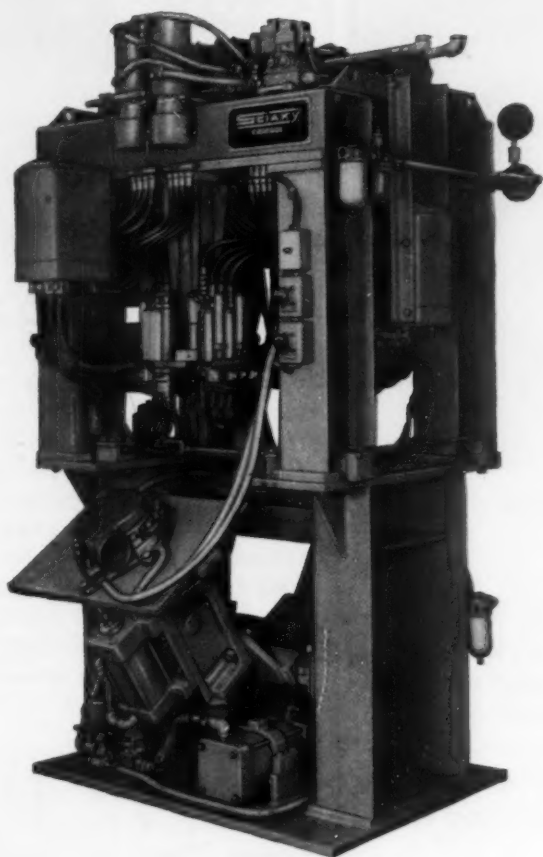
For more data circle No. 34 on postcard, p. 239.
Turn Page

NEW

HIGH PRODUCTION WELDER

READILY ADAPTABLE TO

PRODUCTION CHANGES



The Sciaky Standard SX Electric Resistance Welder equipped as a 36 Gun Unit for welding blower housings at the rate of 500 per 50 minute hour.

New Sciaky Standard Multiple Gun Welder Designed for Wide Variety of Production Applications

High production, multiple gun applications no longer require uneconomical C-frame type electric resistance welding machines with special tooling, or complex, specially designed, one-job machines.

Now, Sciaky, pioneers and inventors of electric resistance welding machines, offers a standard multiple gun welder that can be readily adapted for production changes within the capacity of the machine.

The Sciaky SX Welder, a dual platen unit, mounts simple superstructure providing for different arrangements of standard transformer, booster, and welding electrode units.

With approved J. I. C. controls, and featuring either independent or simultaneous dual platen operation, the Sciaky SX Welder offers all the advantages of high production, precision welding, *plus* the tremendous economies of adaptability to production changes.

For complete information, write for Bulletin 313-12.

Preview new Sciaky welders at Booth 2106 National Metals Show, Cleveland, Oct. 19-23.

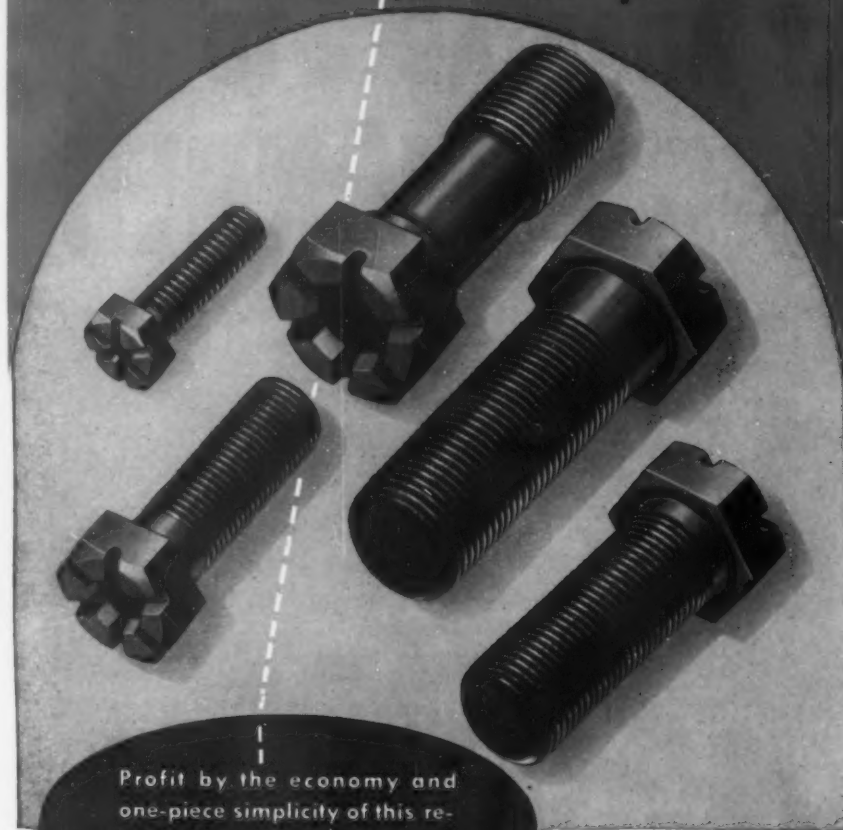
Largest Manufacturers of Electric Resistance Welding Machines in the World

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Plants: Chicago • London • Paris Sales Offices: Chicago, Ill. • Buffalo, N. Y. • Cleveland, Ohio • Dayton, Ohio • Detroit, Mich. • Ft. Worth, Texas • Hollywood, Calif. • New York, N.Y. • Philadelphia, Pa. • Washington, D.C.

Try CLEVELAND Slotted-Type "Place Bolts"*

to solve vibration-point fastener problems



● Find out about Place Bolts *now!* New users and new uses are multiplying daily. A cold-forged fastener made of either high carbon or alloy steel, the Place Bolt head brings *elastic spring action* to bear on seating surfaces, combining with the elastic elongation of the shank to safeguard against loss of initial bolt-tension. Vibration-and-shock-proof holding power is assured. Sizes range from 1/4" diameter upwards, standard or special. Write today for our Place Bolt Folder.

*Licensed under U. S. Patent No. 2543705.

CLEVELAND *Top Quality* FASTENERS

THE CLEVELAND CAP SCREW COMPANY
2917 East 79th Street, Cleveland 4, Ohio

originators of the Kaufman **DOUBLE EXTRUSION** Process

New Equipment

Continued

Arc welders

Two new gasoline engine driven arc welders are a low cost 200-amp dc arc welder powered by a 2-cylinder Wisconsin air cooled engine, and a combination 200-amp ac arc welder and 5 kw ac power unit. The former measures 38 in. long, 21 1/4 in. wide, and 35 5/16 in. high; is compact and lightweight for easy loading and hauling to any job. On the second model, throw-



ing a changeover switch to welder makes it a high capacity 200 amp ac arc welder; throwing the switch to ac power converts the generator into a single-phase, 110 v, 60 cycle power plant of 5 kw capacity, sufficient to run fifty 100-w lamps or floodlights, or a total of 6 hp of motors. This unit is powered by a Wisconsin 4-cylinder air cooled engine for low cost operation. Portable mountings are available for both models. *Hobart Brothers Co.*

For more data circle No. 35 on postcard, p. 239.

Cutoff wheels

The Norton B9 is an improved resinoid bonded cutoff wheel, said to be making possible savings up to 85 pct in the cost of cutting-off operations. R50 is an improved rubber bonded wheel which has been designed to give a high quality cut with no burr, burn or case hardening of the ends of the work. This wheel is designed for cutting solid stock. A companion wheel, the R20, has been developed especially for cutting tubing and hollow stock. *Norton Co.*

For more data circle No. 36 on postcard, p. 239.

Turn to Page 257

New Equipment

Continued

Automatic welding

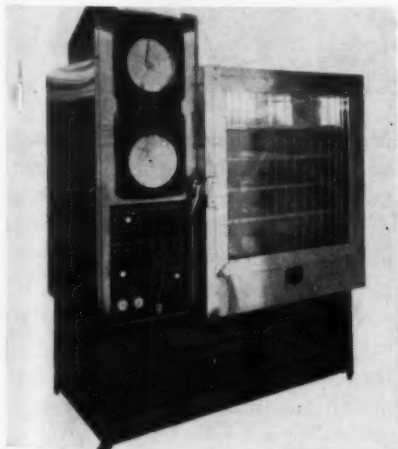
A new automatic welding development, the Spreadarc, is equipment that oscillates a standard welding head from side to side to create a wide bead. In hardsurfacing applications it is said to increase the speed of welding 900 pct over old methods using hand electrodes and multiple beads. New Twinarc equipment adapts a standard welding head for multiple arc welding. The use of two arcs with one welding head rather than using two heads simplifies the control and operation of multiple arc welding and gives the high speed and deep penetration of two heads for the cost of one. In Twinarc welding, two electrode wires are fed through a single contact jaw to the work. It increases speeds of welding up to 50 pct. *Lincoln Electric Co.*

For more data circle No. 37 on postcard, p. 239.

Moisture-vapor tests

The 15-CF atmosphere control cabinet is built for any type of moisture-vapor testing within the limits of -20°F to $+200^{\circ}\text{F}$ with a relative humidity of 18 pct to slightly under 100 pct. This type of cabinet is used primarily for testing greases, packaging materials, plastics, tools, chemical and metallurgical samples, or any materials which may be affected by temperature and/or humidity. Conventional or electronic controls are available. *Package Materials Laboratories, Inc.*

For more data circle No. 38 on postcard, p. 239.



Turn Page



A "hot idea" for self-palletizing hot zinc ingots

Another example of packaging magic done with Signode Steel Strapping!

Hot ingots once were formidable foes when you tried to package them for fast, safe handling. Then Signode gave a practical twist to a basic handling method and the answer was found!

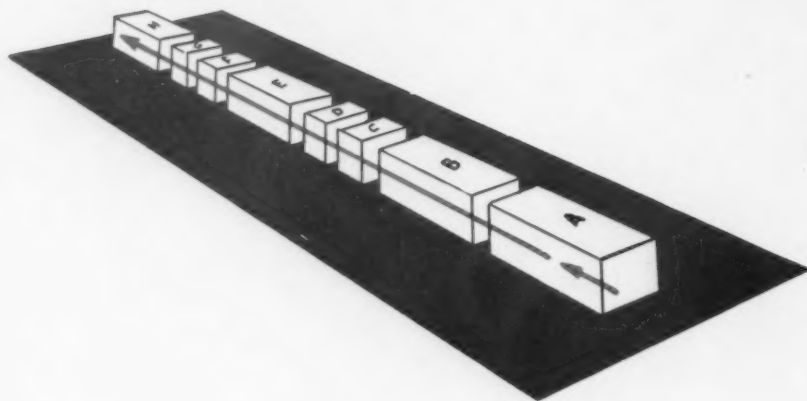
Special molds were designed to form the basic legs, allowing complete self palletization of the units. Other ingots, still hot, were stacked on this base. The entire unit was strapped with Signode material—saving an astonishing amount of man power and tonnage, and ending the need for pallets.

How can you use Signode's broad knowledge of *basic unitizing methods*? Find out now! Our Signode fieldman will help you decide—without obligating you in any way. Write Signode Steel Strapping Co., 2623 N. Western Ave., Chicago 47, Ill. Offices coast to coast. In Canada: Canadian Steel Strapping Co., Ltd. Foreign subsidiaries and distributors world-wide.

SIGNODE Steel Strapping Co.

SEND FOR FOLDER SHOWING 6 BASIC WAYS OF UNITIZING

Heat Treat Furnace Layout by *Holcroft*...3rd of a Series



- | | |
|-----------------------------------|-----------------------------------|
| A Carburizing furnace | E Second hardening furnace |
| B First hardening furnace | F Quench tank and elevator |
| C Quench tank and elevator | G Wash and dry |
| D Wash and dry | H Draw furnace |

Steady Production Flow . . . Different Treating Cycles . . .

Holcroft devised an unusual furnace layout for a manufacturer who had the problem of heat treating a continuous flow of small parts . . . but with different treating cycles.

Four furnaces were placed in line. All production was carburized in the first. Part of the work, then, proceeded through the next three furnaces for refining, hardening and drawing. Another portion by-passes the refining operation and is hardened and drawn. The rest of the production is hardened in the second furnace, drawn at high temperatures in the third, and by-passes the fourth.

This is typical of the economies Holcroft produces for its clients. It's how one manufacturer found that Holcroft furnaces—*individually designed for the specific job*—will produce large volume heat treating at a low-cost-per-heat-treated-piece. Holcroft & Company, 6545 Epworth, Detroit 10, Michigan.



PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO 9
J. M. Bradley, A. A. Engelhardt
4309 South Western Blvd.

CLEVELAND 15
Wallace F. Schott
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HOUSTON 1
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5724 Navigation Blvd.

CANADA
Walker Metal Products, Ltd.
Windsor, Ontario

EUROPE
S. O. F. I. M.
Paris 8; France

—New Equipment—

Continued

Temperature indicants

New temperature ratings for Tempilstiks°, Tempilaq° and Tempil° Pellets are 413°, 425°, 438°, 463°, 475° and 488°F. This range is of particular interest in preheating for welding, tempering of tool steels, shell molding and a number of other industrial applications. Tempil° products are available in 12 or 13-degree steps from 113° to 500°F plus the recently added 525°F rating, and in 50-degree steps from 550° to 2000°F. Temperature range of pellets is from 2050° to 2500°F. Tempil° Corp.

For more data circle No. 39 on postcard, p. 233.

Milling machines

Four new ram-type milling machines have been engineered to provide utmost accuracy of work, increased range plus long operating life. Featuring the adjustable cutterhead, these machines permit conventional horizontal, vertical and angular milling with one machine. Design features of the mill-



ing machines include heavier bases and columns, larger more rugged table, saddle and knee assemblies with feed motor mounted on side of knee. Heavier rams provide greater ram movement over the column. Large hand wheels have easy-to-read dials. Percent of cutting load is shown on a new load meter mounted on the electrical control panel. Van Norman Co.

For more data circle No. 40 on postcard, p. 239.

Turn Page

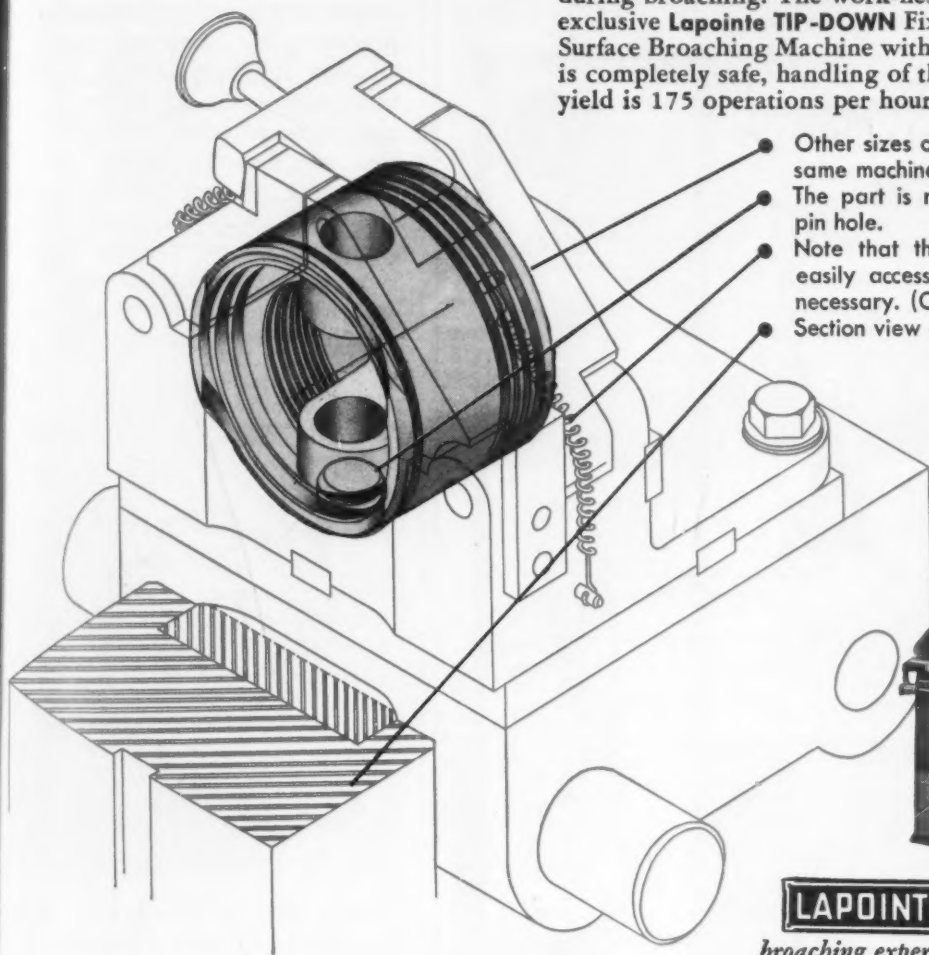
LAPOINTE SURFACE BROACHING

... the most economical method of metal removal

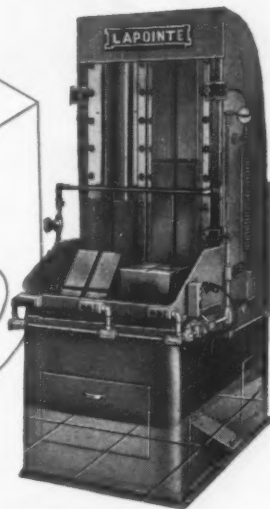
for **high production!**

This piston is a good example of what can be done by **LAPOINTE** surface broaching. A "contour cut" is broached crosswise, across the end . . . with the piston firmly held in a fixture of unique Lapointe design.

We call it a shroud. Our engineers developed this quick-acting fixture to encompass the part and prevent distortion during broaching. The work-nest is mounted on the exclusive **Lapointe TIP-DOWN** Fixture, on a 5-ton DRV Surface Broaching Machine with 42-inch stroke. Operation is completely safe, handling of the parts is convenient, yield is 175 operations per hour!



- Other sizes of pistons can be broached on the same machine, by changing the liners.
- The part is rotatively located from the wrist-pin hole.
- Note that the springs are out in the open, easily accessible for quick replacement when necessary. (Customer's request.)
- Section view of broach and broach body.



LAPOINTE with more than 50 years of broaching experience, can take full responsibility for designing and building the machines, tools and fixtures to suit your requirements. For information,

write for Bulletin **DRV-9**

THE

LAPOINTE

MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

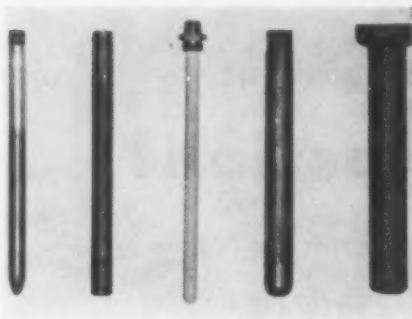
In England: Watford, Hertfordshire



THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

New Equipment

Continued



Tube provides closer temperature control

New thermocouple protection tube provides closer temperature control at reduced cost. It is of extra heavy drawn construction with $\frac{1}{2}$ -in. pipe thread and has over 25 pct more metal than standard weight tubes. Longer life is also due to the alloy employed: incoloy, 32 pct nickel, 21 pct chromium.

Closer control results from better fit around a No. 8 gage thermocouple keeping air space and mass of tube to a minimum consistent with long life. Sizes are in any multiple of 6 in. The same alloy is also available in $\frac{3}{4}$ and 1-in. pipe sizes. *Arklay S. Richards Co., Inc.* For more data circle No. 41 on postcard, p. 239.

Double-Barrelled Economy!

Meets small budgets for new equipment...

Meets all production requirements!

benchmaster The standard of the industry for small mills and punch presses



These rugged, low cost presses have set the world's standards for small presses! Unmatched for economy of operation, high productive capacity and overall performance. More than 50,000 now in use throughout the world in almost every conceivable industry. Available in 1-, 4-, and 7½-ton capacities, 51 models; Standard and Deep Throat Types.

benchmaster mills...

cost less than many big mill accessories!

Here is the precision performance you expect only from big, expensive mills... on production jobs within their capacity two or more compact Benchmasters often out-produce large machines at a fraction of big mill cost! Ideal for tool room, production, experimental, die making and thousands of other uses.

Precision Tapered Roller Bearings assure tight, chatter-free milling under heavy loads.

Mills Vertically or Horizontally—Interchangeable spindle assemblies permit both horizontal and vertical milling—One machine does both jobs efficiently!

Fast, Simple—Angle power for 2½ hp. metal removal, simple operation for unskilled help.

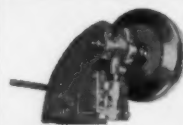
Production Models—Equipped with rack and pinion feed for fast table reciprocation.



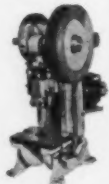
Ask for detailed information on Benchmaster presses, mills and accessories today!

Benchmaster Manufacturing Company
1835 W. Rosecrans Avenue, Gardena, California

benchmaster



Half Presses
—available in 4-Ton and 7½-Ton models for jobs demanding unlimited shut height.



Back Geared Presses
—available in all 4-Ton and 7½-Ton models for blanking, forming and drawing operations!



Belt Sander
Ideal for all belt sanding applications. Positive trackage adjustment. Uses belts from $\frac{1}{4}$ " to 1" wide by 44" long. Speeds up to 8000 S.F.M.

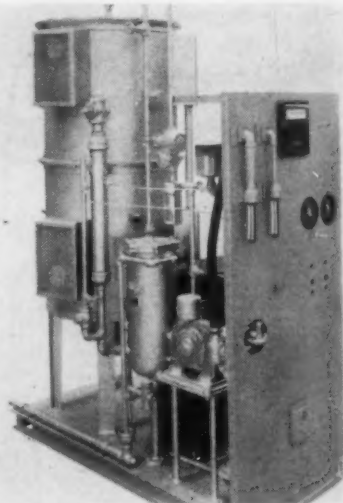


Arbor Presses
Engineered to equalize stresses over all! Heavy, stub-tooth alloy steel rack and pinion gears. 3 sizes: $\frac{1}{2}$ -, 1-, and 2-ton. Lever operation, plain base or platen.

World's largest manufacturer of small punch presses and mills.

Endothermic generator

This efficient endothermic gas generator will produce controlled atmosphere of consistent chemical analysis for heat treating operations such as bright hardening of high carboned steels without oxidation or decarburization; bright hardening of molybdenum, tungsten, and cobalt high-speed steel; annealing and normalizing; bright copper brazing, carburizing and carbonitriding; sintering and powder metallurgy processes that re-



quire a reducing atmosphere. It is a complete package unit. The air filter, air gas mixing machine, gas cracking chamber, gas cooler, control panel, and power transformer are all mounted on a structural steel base. The generator has been designed for economical, safe and simple operation. No special supervision is required. Available in three sizes—300, 500 and 750 cu ft per hr. Removable parts make inspection and maintenance a simple matter. *Hevi Duty Electric Co.*

For more data circle No. 42 on postcard, p. 239.

Free Publications

Continued from Page 242

Protect your plant

Here's Low Cost Protection for Plant Property is the title of a new folder being distributed by Armco Drainage & Metals Products, Inc. The publication explains how Flex-Beam Guardrails protect many parts of industrial plants. A dimensional drawing shows how the guardrail is assembled. *Armco Drainage & Metal Products.*

For free copy circle No. 17 on postcard, p. 239.

Current transformers

General Electric's Type JKR-O indoor current transformers for operating watt-hour meters or instruments are covered in a new bulletin. Information is given on the transformer's application, construction features, accuracy ranges, thermal rating, and various engineering and design aspects. *General Electric.*

For free copy circle No. 18 on postcard, p. 239.

Beryllium copper tools

Advantages of beryllium copper tools as a safeguard against accidental fire or explosion caused by sparks are described in an illustrated folder available from Beryllium Co. The folder points out that beryllium copper is non-sparking which makes it safer than other metals. *Beryllium Corp.*

For free copy circle No. 19 on postcard, p. 239.

Conveyor lubricator

Method of automatically lubricating entire conveyor lines is described in a bulletin issued by Stewart-Warner Corp. The publication illustrates and explains the use of the company's conveyor trolley wheel lubricator. *Stewart-Warner Corp.*

For free copy circle No. 20 on postcard, p. 239.

Milling machines

G. A. Gray heavy duty planer-type milling machines are the subject of a 20-p. catalog. Illustrations showing these millers in operation are included. *G. A. Gray Co.*

For free copy circle No. 21 on postcard, p. 239.

Non-corrosive fittings

Speedline corrosion-resistant fittings for use with light wall pipe are described in a new 24-p. catalog. These fittings are said to be readily adaptable to existing pipelines, valves, pumps and other types of plant equipment. *Horace T. Potts Co.*

For free copy circle No. 22 on postcard, p. 239.

Weldments

Offering a complete design service, Graver Tank & Mfg. Co. is fully equipped to produce quality fabrications from their own or customers' designs. Samples of the types of weldments produced by the company are shown in a new bulletin. *Graver Tank & Mfg. Co., Inc.*

For free copy circle No. 23 on postcard, p. 239.

THAT SETTLES IT—
WE INSTALL
J&L
JAL-TREAD
FLOOR PLATES



The safety of your employees and the public is good enough reason to install walking surfaces of slip-resistant J&L Jal-Tread floor plate.

But here are some other important advantages you'll get when you specify Jal-Tread, the only true checker-board floor plate.

- Reduced worker fatigue from feet rocking on uneven surfaces.
- No wheel shimmy in hand industrial trucks.
- Neat appearance . . . easy draining and sweeping in any direction.
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J&L
STEEL

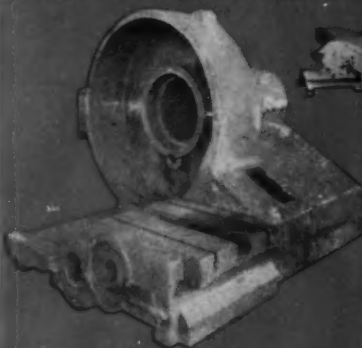
Hyde Park ROLLS and ROLLING MILL EQUIPMENT



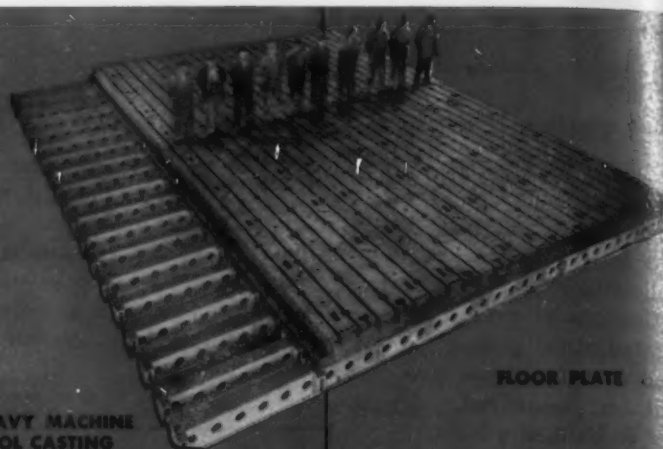
The Red Circle is the Hyde Park mark of quality.

You will never find it on an unworthy roll, nor on any but the best and most dependable roll of its type. It is symbolic of the high integrity and efficient performance of all Hyde Park Rolling Mill Equipment.

HEAVY MACHINE
TOOL CASTING



FLOOR PLATE



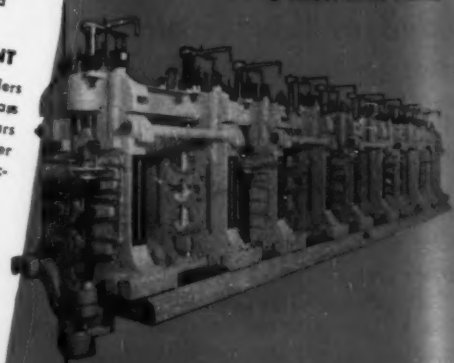
ROLLER TABLE



24 INCH
3 HIGH BAR MILL



12 INCH
3 HIGH BAR MILLS



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Bar Mills • Merchant Mills • Stretcher Levellers
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GRAY IRON CASTINGS UP TO 80,000 LBS.

Machinery Castings • Mill Housings
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Lay-out Plates • Pinion Housings
Surface Plates

Hyde Park

FOUNDRY & MACHINE CO.
HYDE PARK, WESTMORELAND COUNTY, PITTSBURGH DISTRICT, PA.

The **Iron Age**

SALUTES

Dr. James B. Austin

Selected as the new president of the ASM, he's a modest man who always seems to rise to the top.



JIM AUSTIN can always be counted on to do an outstanding job, but he's the one person who would never tell you about it. Despite his modesty, his ability as a chemical engineer, talent as an executive and faculty of getting along with people, invariably make him one of the leaders in any organization he joins.

Director of research for U. S. Steel, former chairman of both the American Society of Metals, New York chapter and the Refractories Div. of the American Ceramic Society, Jim also headed the Defense Dept.'s Chemical Warfare Research & Development Board until it was disbanded in July.

So it's not surprising that he has now been chosen president of the American Society of Metals—it fits into the pattern perfectly.

Indication that Jim likes to see a job through is the fact that he's been with U. S. Steel ever since he earned his Ph.D. in chemistry at Yale in 1928. Starting as a physical chemist at U. S. Steel's research lab in Kearny, N. J., he was made supervisor of chemistry in 1941 and assistant lab director in 1944. In 1946 he succeeded his former chemistry professor, the late Dr. John Johnston, as director of research.

One of metallurgy's best story-tellers, Jim has a fine sense of humor and a faculty for remembering almost everyone he was ever associated with. A reflection of his bent for research, he is a member of that group of fanatic followers of Sherlock Holmes, the Baker Street Irregulars. Among his many other interests: classical music, tennis, gardening.

Specialty wires are a specialty

with

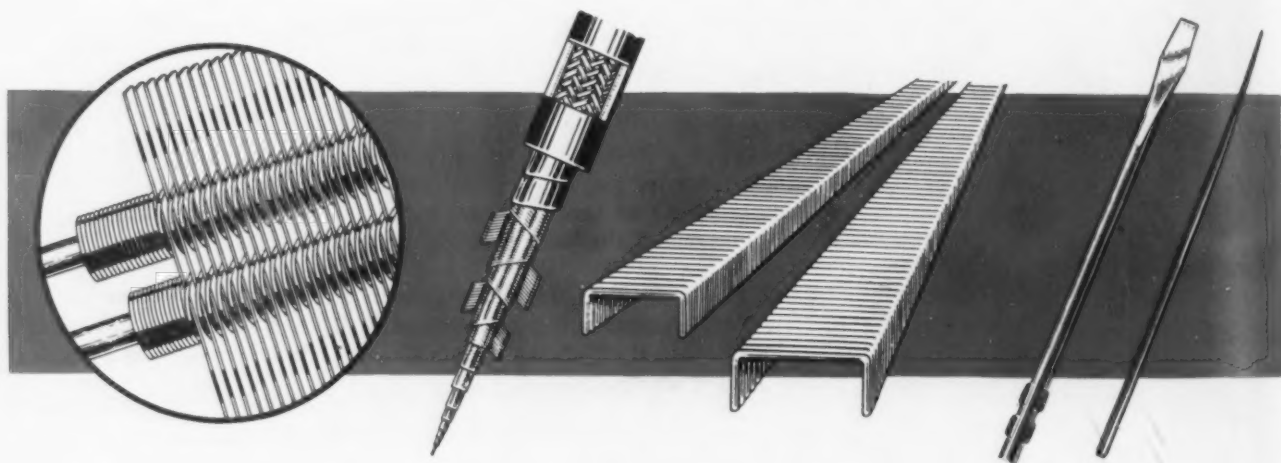
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The Iron Age

INTRODUCES

S. S. Meadows, appointed vice-president and manager, new Marvel Schellier Transmission Dept., BORG-WARNER CORP., Decatur, Ill.; Glen Bamberger, becomes works manager, Carburetor and Aircraft Depts.; and Edward Walsh, becomes assistant chief industrial engineer, same departments.

M. B. Mentley, elected vice-president in charge of manufacturing, NATIONAL BROACH & MACHINE CO., Chicago; B. F. Bregi, elected vice-president, engineering; G. R. Smith, becomes treasurer; and D. P. Smith, named assistant secretary and assistant treasurer.

Walter C. Thompson, becomes executive vice-president, THE TORRINGTON CO., Torrington, Conn.; succeeding Alfred W. Burg, who has retired.

Dr. James F. Eversole, appointed vice-president in charge of research, Bakelite Co., a division of UNION CARBIDE & CARBON CORP.

L. H. Geddes, named executive vice-president, GREENLEE BROS. & CO., and its subsidiary Greenlee Tool Co., Rockford, Ill.

C. Neil Norgren, elected vice-president and secretary, C. A. NORGREN CO.; Aksel Nielsen, made vice-president and assistant treasurer, Leigh H. Norgren, elected treasurer and assistant secretary, and Floyd R. Pool, made assistant secretary.

Cruse W. Moss, named executive assistant to the vice-president and general sales manager, Kaiser-Willys Div., WILLYS MOTORS, INC., Toledo.

Theodore W. Rundell, appointed vice-president in charge of operations, SERVEL, INC., Evansville, Ind.

H. C. Mathey and Bicknell Lockhart, elected vice-presidents, THE LIQUID CARBONIC CORP., Chicago.

William W. Brown, appointed director of marketing, CLEVITE CORP.

J. W. Bonnet, appointed administrative assistant to the vice-president, WHITEHEAD METAL PRODUCTS CO., INC.

Nelson C. Walker, appointed director of manufacturing, all plants, MECHANICAL HANDLING SYSTEMS, INC., Detroit.

Dr. Mark E. Putnam, elected a director of CAMPBELL, WYANT AND CANNON FOUNDRY CO., Muskegon Heights, Mich.

Bruce C. Elliott, appointed head, newly formed Market Research Dept., AXELSON MANUFACTURING CO., Division of Pressed Steel Car Co., Inc.

J. Stuart Franklin, appointed supervisor, Lighting and Rectifier Dept. Photometric Laboratory, Lynn, Mass., GENERAL ELECTRIC CO.

Richard C. Davis, appointed assistant industrial relations manager, THE TRANE CO., La Crosse, Wis.

Philip C. Muccilli, appointed production manager, NATIONAL LEAD CO., New York.

Theodore E. Burleigh, appointed sales engineer, Sales Dept., NATIONAL RESEARCH CORP., Cambridge, Mass.

A. D. L. Orefice, appointed chief engineer, Coke Plant Dept., KOPPERS CO., INC., Pittsburgh; and G. F. Ross, appointed assistant chief engineer.

Percy L. MacGowan, appointed Chicago district engineer, THE YOUNGSTOWN SHEET & TUBE CO., East Chicago, Inc. He succeeds H. C. Williamson, who has retired.

Edward H. Rollfs, joins Boston sales and service staff, WYANDOTTE CHEMICALS CORP.; Samuel M. Peek and Paul G. Lackney, join the Cleveland sales and service staffs.



E. R. ROWLEY, named president, Titanium Metals Corp. of America, New York.



JOHN E. GAGNON, appointed director of personnel, Olin Industries, Inc., East Alton, Ill.



J. T. DUGALL, appointed rod, bar and wire operations manager, Kaiser Aluminum & Chemical Corp., Oakland.

Personnel

John E. MacArthur, appointed superintendent, General Stores & Tool Cribs, AC Spark Plug Div., GENERAL MOTORS.

Richard F. Protiva, appointed district sales engineer, HEIL PROCESS EQUIPMENT CORP., Cleveland.

Albert E. Merwin, appointed sales and technical service manager, Lurium Aluminum Div., FROMSON ORBAN CO., INC., New York.

Donald W. Withrow, appointed methods engineer, ELECTRO REFRACORIES & ABRASIVES CORP.

Ross B. Hopkins, appointed plant metallurgist, RODNEY METALS, INC., New Bedford, Mass.

B. P. Gibbons, appointed manager of material, CONSOLIDATED VULTEE AIRCRAFT CORP.; **Paul G. Osborn**, named factory manager, Plant I, San Diego Div.

Lawrence Leach, appointed manager, AMERICAN MACHINE & FOUNDRY CO., New Haven Plant.

Ralph J. Wiethorn, appointed manager, Pittsburgh General Sales office, HARBISON - WALKER REFRACORIES CO.

Stanley J. O'Dea, named head of the industrial relations department, Canton, Ohio, UNITED STATES STEEL CORP.

W. J. Muller, appointed manager, Orlando Sales Office, CHASE BAG CO., Chicago.

Leland W. Kuhn, appointed district manager, Kansas City Branch, HUBBELL METALS, INC., St. Louis.

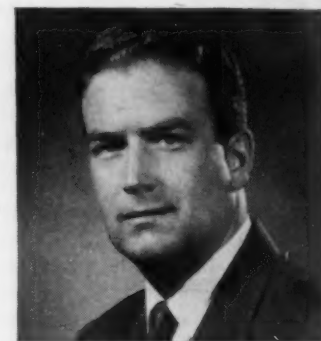
George L. Bitting, promoted to assistant product manager, for foil, KAISER ALUMINUM & CHEMICAL SALES, INC., Oakland, Calif.

Louis E. McIntosh, appointed district manager, LAUBE STEEL CO., Chicago.

George A. Davis, appointed New England Sales representative, THE CARPENTER STEEL CO., Alloy Tube Div., Union, N. J.



ERNEST NUBER, appointed sales manager, The Bristol Co., Waterbury, Conn.



WILLARD J. FLINT, named sales manager of steel containers, Continental Can Co., New York.



C. A. BRASHARES, named assistant general sales manager, Harbison-Walker Refractories Co.



RICHARD S. MOORE, named assistant general sales manager, Harbison-Walker Refractories Co.

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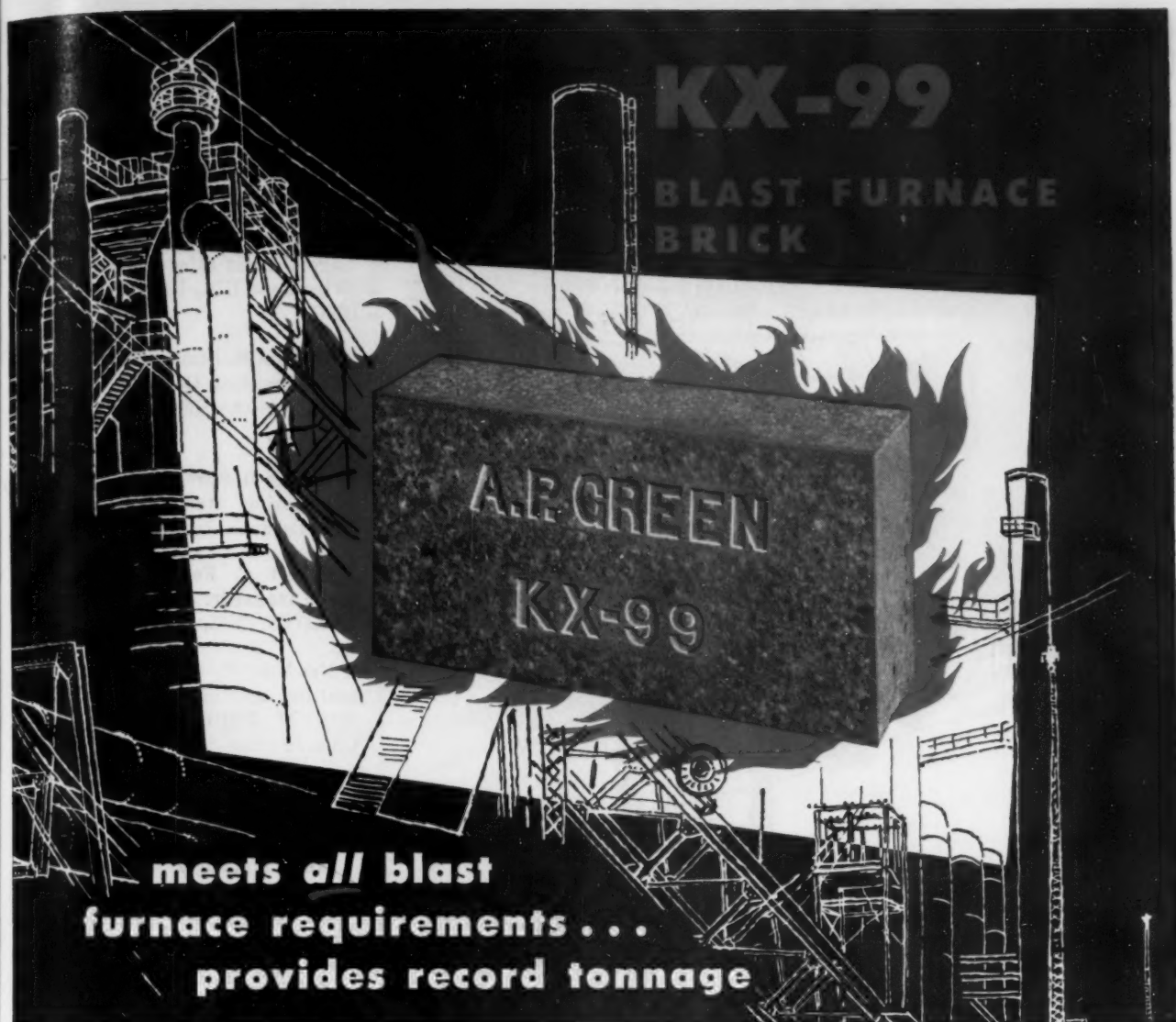
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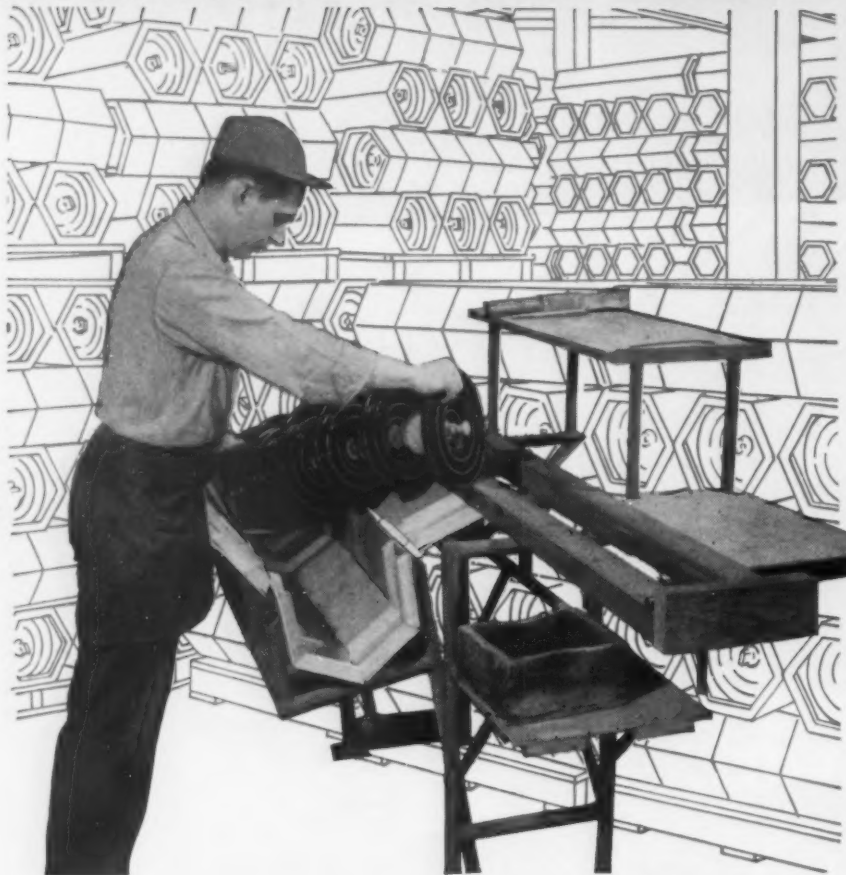
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Personnel

Continued

Hubert R. Carlson, appointed regional zone manager, Southern Division, Delta Power Tool Div., ROCKWELL MFG. CO., Pittsburgh.

G. N. Dow has been appointed Chicago District sales manager, Leschen Wire Rope Div., H. K. PORTER CO., INC.

William M. Staples, named manager of construction, Chemical Construction Corp., an AMERICAN CYANAMID CO. unit.

George B. Furey, appointed to sales engineering staff, HONAN-CRANE CO., Lebanon, Ind.

Robert C. Ford, appointed territorial manager, Pittsburgh, ROLLED ALLOYS, INC., Detroit.

Newbold C. Goin, appointed general manager of the BENADA ALUMINUM PRODUCTS CO., Girard, Ohio.

Edwin A. Locke, Jr., elected a director, UNION TANK CAR, Chicago.

James McLoughlin, appointed manufacturers' agent, central New York State, BASCO MFG. CO.; and H. Cluve Morrison, named manufacturers' agent, Wisconsin and upper Michigan peninsula.

Allen N. White, Jr., has been appointed sales promotion manager, Television-Radio Division, Metuchen, N. J., WESTINGHOUSE ELECTRIC CORP.

J. Paul Tierney, appointed assistant superintendent of the rod, wire, and conduit plant, Struthers, Ohio; YOUNGSTOWN SHEET & TUBE CO.; and Carl A. Swanson, was named assistant district engineer for the Chicago district.

Rollo W. Boring, sales manager, ROLLED ALLOYS, INC., also recently elected vice-president in charge of sales.

Robert E. Layman, has been named assistant executive vice-president, THE NATIONAL ASSOCIATION OF FOREMAN, Dayton, Ohio.

E. B. Sulkoska, named purchasing agent, Bellefontaine, Ohio, plant, Delta Power Tool Division, ROCKWELL MANUFACTURING COMPANY.



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Rochester, N.Y.

Fairfield, Conn.



Personnel

Continued

Byron Getman, becomes supervisor of purchasing follow-up, SERVEL INC.; and Louis R. Smith, becomes buyer of fabricated metal parts, washers, chemicals and outside plating.

C. C. Hurlburt has joined the Welding Division, P. R. MALLORY & CO., INC.

Harry Hariton, appointed sales representative, WAGNER BROTHERS, INC., Detroit.

A. A. Fomilyant, named a general manager, Macnick Div., Tulsa, Okla., ROCKWELL MFG. CO., Pittsburgh; E. M. Cloran becomes division district manager; and W. M. Conner will supervise sales and production liaison between Div.'s national headquarters at Pittsburgh and divisional plants and field offices.

Robert H. White named south Texas sales representative, SNAP-TITE, INC., Union City, Pa.

Frank W. Fletcher has been appointed representative, Nashville area, FARREL-CHEEK STEEL CO.

Gerald R. Cox has joined the sales staff, Pacific Branch, San Francisco, THE NATIONAL RADIATOR CO.

Clifford O. Richards has been appointed purchasing agent, BONNEY FORGE & TOOL WORKS, Allentown, Pa.

OBITUARIES

Clark T. Morse, 65, Detroit industrialist, president, American Blower Corp., Dearborn, Mich., and the Canadian Sirocco Co., Ltd., Windsor, Ontario, recently.

George J. Bergen, 69, a retired employee of the openhearth division, THE MIDVALE CO., recently.

William A. Ray, 69, former general sales manager, Toledo Scale Co., Detroit Branch, recently.

Wendell J. Dernberger, 49, material handling supervisor, Ford Motor Co., recently. He was a director of the National Material Handling Society and a member of the Material Handling Institute.



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Heat Treating P. 280

Solution Control P. 286

Melting and Rolling P. 288

Welding P. 294

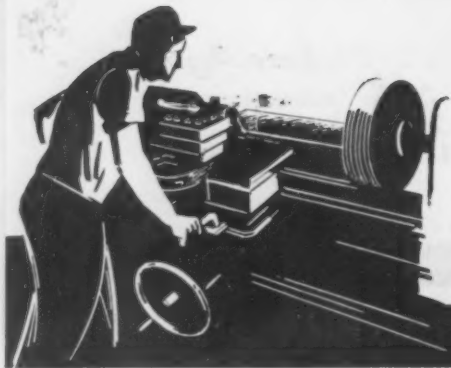
Counting and Weighing P. 298

Foundry P. 302

What It Means to You P. 306

AUTOMATIC PROCESS CONTROL

Industry faced with growing competition at home and abroad must find new ways to cut costs. One answer lies in automatic process control . . .



GAGING & SORTING

AUTOMATIC PROCESS CONTROL

- Piston pin gages handle 3000 per hr.
- Sheet sorter makes readings 40 in. apart.
- Roller bearing gages match grinder production.
- Muffle boxes gaged and sorted in 27 classes.
- Automatic gaging used in machine control.

INSPECTION

**High costs, greater accuracy
increase trend to automatic gaging.**

Parts inspection is a costly, tedious and time consuming process. Where large quantities are required, inspection costs may run more than the actual production of the piece itself. To reduce these costs, speed up inspection and eliminate rejects due to operator error, greater emphasis is being placed on automatic gaging and sorting. The feeling is growing that gaging should be given as much consideration as tools and other equipment in setting up a manufacturing operation.

Most automatic gaging and sorting machines are not directly tied into manufacturing operations. Parts to be inspected are carried to and from the machine. However, the desire for greater handling efficiency is resulting in an increasing number of automatic gages being

installed directly into production lines. The ultimate in automatic gaging calls for gaging mechanisms to control machine operation so that parts are produced within the desired accuracy.

Gages which can be built for automatic parts measurement include air, electronic, and electro magnetic types. They can be used to check for hardness, compressibility, warpage, surface finish, etc., as well as dimensional accuracy. As many as 20 or more dimensions can be checked automatically on one machine. Continuous measuring of a process can also be achieved. Extremely close accuracies are obtainable. Automatic gages can be hand loaded, magazine or hopper fed. Most gages consist of a feeding mechanism, measuring device and ejection unit.

PISTON PINS

**One unit sorts into five sizes,
another has six gaging stations.**

Automatic gaging and sorting of automotive piston pins is done on the machine shown in Fig. 1 which was built for installation in a production line. Finished piston pins are carried from centerless grinders on the main conveyor belt to a gage belt where they are transported to the gaging heads.

At the gaging heads they are checked for triangular out-of-roundness of 0.0005 in. tolerance, taper of 0.0005 in. tolerance and outside dimensions. They are then automatically sorted into

five diameter categories, each differing by 0.00006 in., plus over and under sizes. Pins are checked on this machine at the rate of 3000 per hr. A scleroscope attachment automatically rejects any piston that has not been properly hardened.

Six electronic gaging and reject stations for measuring hardness, surface finish, length, roundness, taper and diameter of piston pins are incorporated in the gaging machine shown in Fig. 2. The parts travel from one gaging sta-

tion to another on hardened v tracks. If a part falls outside limits at any one of these stations, it is rejected as it leaves the station. The machine is flexible since the tolerance at all stations can be adjusted.

The hardness station makes use of a scleroscope equipped with electronic components for automatic operation. The surface finish station works on a light reflection basis. The last station gages the diameter and segregates the parts into five different size categories. Gaging capacity of the machine is 2400 parts per hr. By revising the number and type of gaging stations, this machine can be adapted for the sorting of tappets at a rate of 2200 per hr. Another gaging unit built by the same manufacturer works in increments of 0.0001 in. and gages and sorts tungsten electrical contacts at the rate of 10,000 per hr, see Fig. 3.

Several manufacturers have automatic piston gages on the market. In Fig. 4, conveyors feed pistons to a gaging machine which automatically measures critical dimensions. After gaging, an automatic marking mechanism stamps the skirt diameter with a grading symbol on the inside of the piston for selective assembly later on.

SHEET SORTER

New gage will sort sheets into 20 classifications.

Steel warehousemen have been looking for a gage to sort sheets. A new unit soon to be introduced will measure sheets from 18 to 48 in. wide by 50 to 120 in. long and automatically sort them by gage. They'll be sorted into 20 different gage classifications from 28 to 7, will make spot readings 40 in. apart. An operator will feed the sheets to the gage, the sorting operation will be fully automatic.

BEARINGS

Ball and roller bearings are gaged, sorted at high speeds.

Designed to match the high speed output of roller bearings finish-machined on cylindrical grinders, a hopper-fed unit gages the diameter of roller bearings at a rate of over 21,000 pieces per hr. Diameters are sorted into six categories of 0.0001 in. and also over and undersize.

Pieces are dropped into a hopper, see Fig. 5, positioned and fed endwise into a feeding tube. Parts are stacked side by side in a magazine at the bottom of the tube where a continuously rotating, notched feed wheel picks up and carries a part through the gaging station. When the piece is gaged a size signal actuates a mechanical memory unit which rotates with the feed wheel and workpiece, placing the measured



Photo Courtesy Federal Products Corp.

FIG. 1—Piston gaging machine automatically sorts parts into five diameter categories at a rate of 3000 units per hr.



Photo Courtesy Mertz Engineering, Inc.

FIG. 2—Six electronic gaging stations measure for hardness, surface finish, length, roundness, taper and diameter.

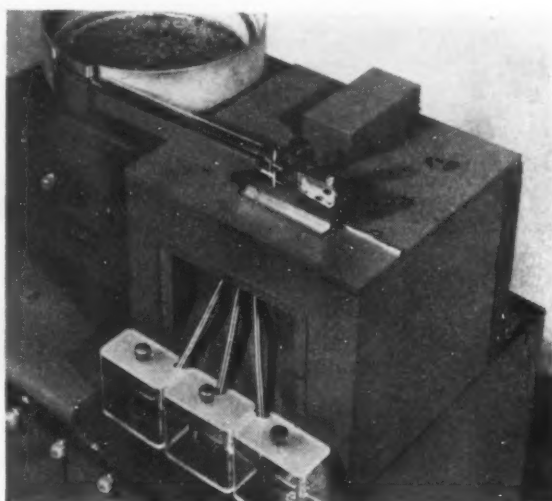


Photo Courtesy Mertz Engineering, Inc.

FIG. 3—Tungsten electrical contacts are gaged and sorted at 10,000 per hr. Machine measures in increments of 0.0001 in.

part at the correct disposal door through which it is rejected.

While gaging and sorting ball bearings $\frac{1}{8}$ in. in diam or larger is a relatively easy automatic operation, the gaging of miniature ball bearings presents a more difficult problem. To do this work a fully automatic hopper-fed gage has been developed to measure steel balls ranging

from $\frac{1}{64}$ to $\frac{1}{16}$ in. in diam. The gage sorts them automatically at a rate of 4000 per hr into six groups of 0.00001 in. each, plus over and undersize. Steel balls ranging from $\frac{1}{4}$ to $\frac{5}{8}$ in. in diam are sorted at a rate of 6000 per hr by an automatic gage, see Fig. 6. They are sorted into six diameter categories each equal to 0.00001 in. or 0.000025 in., plus over and undersize.

MUFFLE BOXES

Two gages check many dimensions on muffle box and component.

Lapped valve plates for refrigerating unit muffle boxes are gaged automatically on a hand-fed machine which segregates them into 27 classifications without damaging the fine surface finish, see Fig. 7.

A motor-driven slide pushes the bottom plate in the vertical loading stack into gaging position. The circular plates are then checked and segregated into three 0.0004-in. major diam classifications by means of air jets and combination air and electric gaging heads. Each of the three diameter classifications is further checked and segregated into eight 0.0003-in. thickness classifications. Rejected parts are segregated as undersize on diameter or thickness, oversize on diameter and oversize on thickness.

After gaging, parts travel through sloping chutes to one of 25 receiving stations or to rejection stations. As the part enters the receiving station the receiver lowers one notch permitting the next part to slide onto the part beneath without harming the finish. Each receiving station has a capacity of 100 parts. When the capacity of a receiver is reached, the machine stops, permitting the operator to unload.

To supplement the above gaging machine, the manufacturer developed a unit for automatically inspecting the refrigerating unit muffle boxes themselves. The machine, see Fig. 8, consists of two identical mechanisms for gaging, classifying and stamping. One can be loaded and unloaded while the other is gaging a part. The machine is rated at 1500 parts per hr at maximum operation.

The gaging cycle is automatically started when a piece is loaded into gaging position. The machine will not cycle unless a part is in the gaging position. Counterbore diameter of the muffle box is checked with a multiple orifice spindle connected with a series of combination air and electric gaging heads. Its size category, one of three of 0.0003-in. tolerance, is retained by a memory device. The depth of the counterbore is simultaneously checked and placed in one of seven categories of 0.0003-in. tolerance each. The final classification is then stamped on the muffle box by means of an automatic stamping mechanism. Lights indicate if a part falls outside limits and the stamping device does not operate.

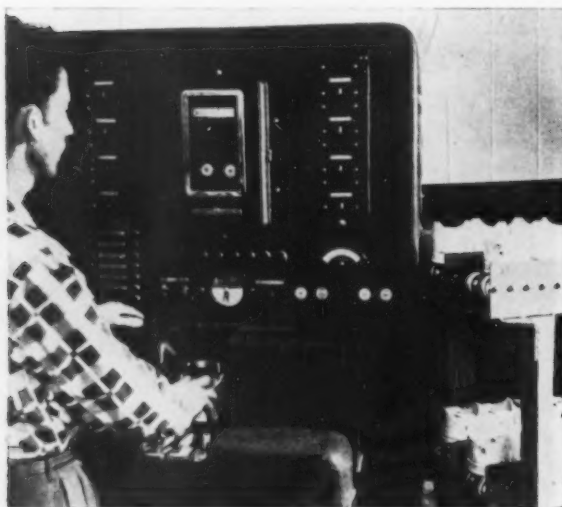


Photo Courtesy Pratt & Whitney

FIG. 4—Piston gaging machine has an automatic marking mechanism which stamps the skirt diameter with grading symbol.

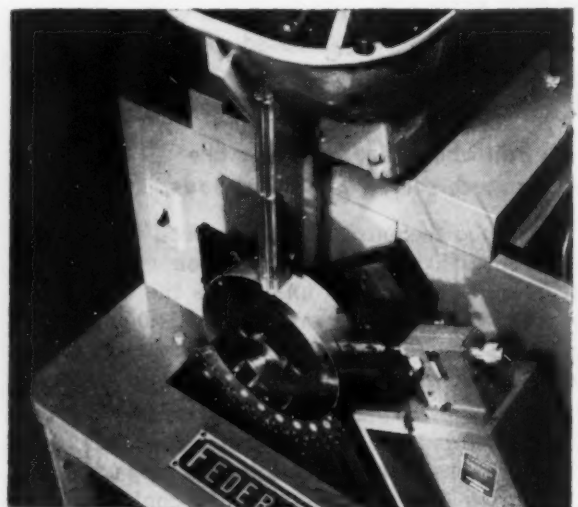


Photo Courtesy Federal Products Corp.

FIG. 5—Notched feed wheel picks up part and carries it through gaging station. Memory unit controls wheel for disposal.

AMMUNITION

Unit checks 30 caliber ammunition for profile, dimensions, weight.

A gaging machine for 30 caliber ammunition features compactness, fully automatic inspection and segregation and a single split chamber gage station, see Fig. 9. It inspects 3600 units per hr at 100 pct efficiency with each complete round checked for profile and alignment, six dimensions and weight. At the same time, the

machine automatically segregates rounds into four categories acceptable or rejected because of improper dimensions, overweight or underweight. If any of the dimensions are faulty, the round is rejected before it reaches the second or weighing station where it is checked to a weight tolerance of 20 grains.

MISCELLANEOUS PARTS

Sparkplug bodies, rivets, magnets sorted and gaged automatically.

Automatic gages can be applied to a wide variety of parts. Cylindrical magnets for radio loud speakers are checked automatically before magnetizing for length and diameter at the rate of 3100 per hr. The hopper-fed parts are placed in gaging position by a reciprocating pusher where it is measured, a size signal obtained and the proper disposal set. The following workpiece displaces the first which drops into the proper disposal bin. All the operator need do is load the hopper and unload the bins. The machine automatically rejects all parts outside dimensional limits and sorts those within limits into three size categories and counts the number in each category. Parts ranging from $\frac{1}{2}$ to $1\frac{1}{2}$ in. in diam and $\frac{5}{16}$ to $1\frac{1}{8}$ in. in height are handled on the same gage.

Other parts which have been successfully measured and sorted automatically include spark plug bodies, cutter bits, chain saw rivets and thin copper washers. The distance from the end to the inside shoulder of three sizes of spark plug bodies are measured within plus or

minus 0.005 in. on a hand-fed machine which automatically diverts them into over, under and within size chutes. Soft copper washers, only 0.001 to 0.0014 in. thick, can be measured for thickness and sorted into five categories of 0.0001 in. each, plus over and undersize. The proper trap door opens after each washer is gaged so that the operator cannot divert the gaged washer into the wrong classification.

A combination air-electric machine for automatically sorting carriage rolls is now being built for a manufacturer of business machines. The hopper-fed rolls slide down a chute into a gaging fixture where they are automatically rotated as six air jets check the outside diameter and out-of-round condition.

The air impulses are converted into electrical impulses by means of air diaphragms. The electrical impulses actuate solenoid mechanisms which automatically divert the gaged part into the proper size receptacles. Carriage rolls are sorted into three size categories, plus over and undersize. Output is 1200 parts per hr.

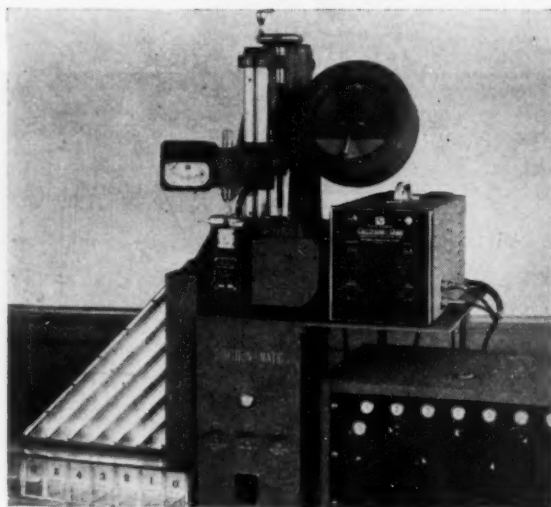


Photo Courtesy Federal Products Corp.

FIG. 6—This gage automatically measures steel ball bearings and sorts them at a rate of 4000 per hr into six groups.

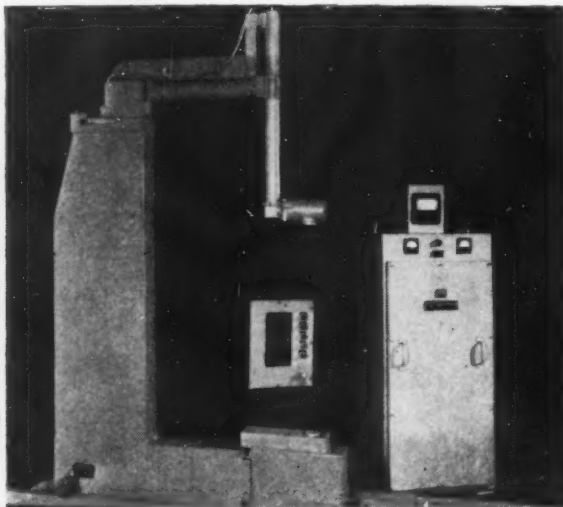


Photo Courtesy The Sheffield Corp.

FIG. 7—Fine surface of lapped valve plates is protected in this machine which classifies them into 27 categories.

MACHINE CONTROL

Gages control machines to produce parts within tolerance.

One of the most promising applications for automatic gaging is in automatic machine control. Gages are built right into the machine which continuously adjusts the operation so that parts are produced within tolerance. If tolerances are thrown off to an extent where they cannot be adjusted by the gage, the machine stops automatically.

Most progress along this line has been made with continuous manufacturing processes. An automatic extruder control gage has been developed to control the diameter of plastic-coated wire after it leaves the extruder, see Fig. 10. If the extruded wire starts running oversize, the measuring unit adjusts the machine to run at a faster rate, thus depositing a thinner coating on the wire. If the coating is too light the measuring unit slows down the machine, permitting a thicker coating to be applied. Gages of this type can control wire diameter variations to within 0.001 in. Con-

tinuous measuring gages have also been applied to regulating the diameter and roundness of glass tubing and the thickness of cardboard.

How grinders are controlled

Automatic machine control applied to the production of individual pieces on a cylindrical grinder is shown in Fig. 11. The electrical controls in the gage are wired into the machine controls. When the piece reaches finish size, the gage causes the wheel to back away from the work and the spindles to stop. Accuracy better than 0.00005 in. is possible. All the operator does is load the machine and snap the gage onto the part. Finish size is maintained regardless of wheel wear or wheel dressing. At a big bearing plant, a similar gage has been installed on internal grinders for grinding of bearing races, see Fig. 12. If the parts are produced outside tolerance limits the machine shuts off.

ABOUT MANUFACTURERS

Each section of this issue is followed by lists of manufacturers. These are the names of makers of equipment of the type described in the various sections. Every effort has been made to provide a complete list. The editors would appreciate knowing of any omissions so that they may receive consideration in future issues.

Manufacturers

Manufacturers of the type of automatic control equipments described in this section include:

Federal Products Corp.
Mertz Engineering, Inc.
Pratt & Whitney Div.,
Niles-Bement-Pond Co.
The Sheffield Corp.
The Taft-Pierce Mfg. Co.



Photo Courtesy The Sheffield Corp.

FIG. 8—Refrigerating unit muffle boxes are gaged at the rate of 1500 per hr. Size categories are automatically stamped.



Photo Courtesy The Sheffield Corp.

FIG. 9—Gage for 30 caliber ammunition checks for profile and alignment, six dimensions and weight at 3600 per hr.

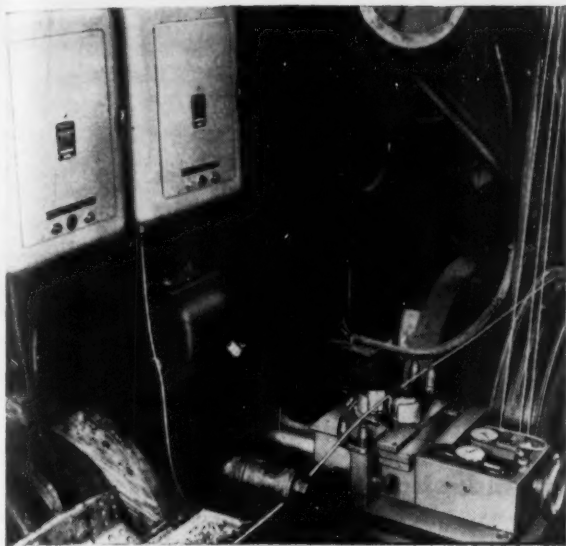


Photo Courtesy Federal Products Corp.

FIG. 10—Continuous gage on extruder adjusts machine to achieve proper thickness of plastic coating on extruded wire.

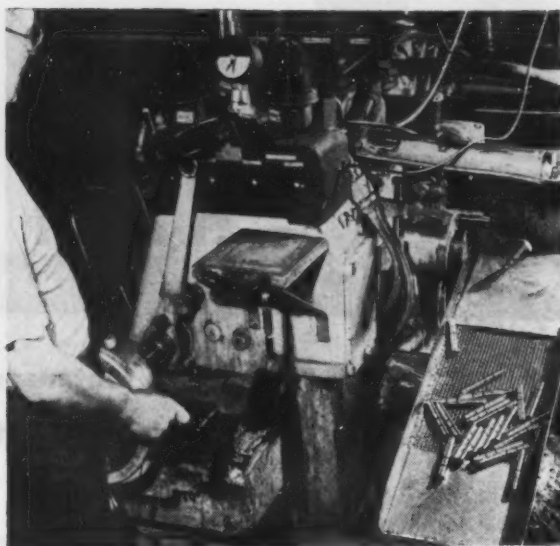


Photo Courtesy Pratt & Whitney

FIG. 12—Large bearing plant installed gages on several types of grinders to produce a number of different parts.

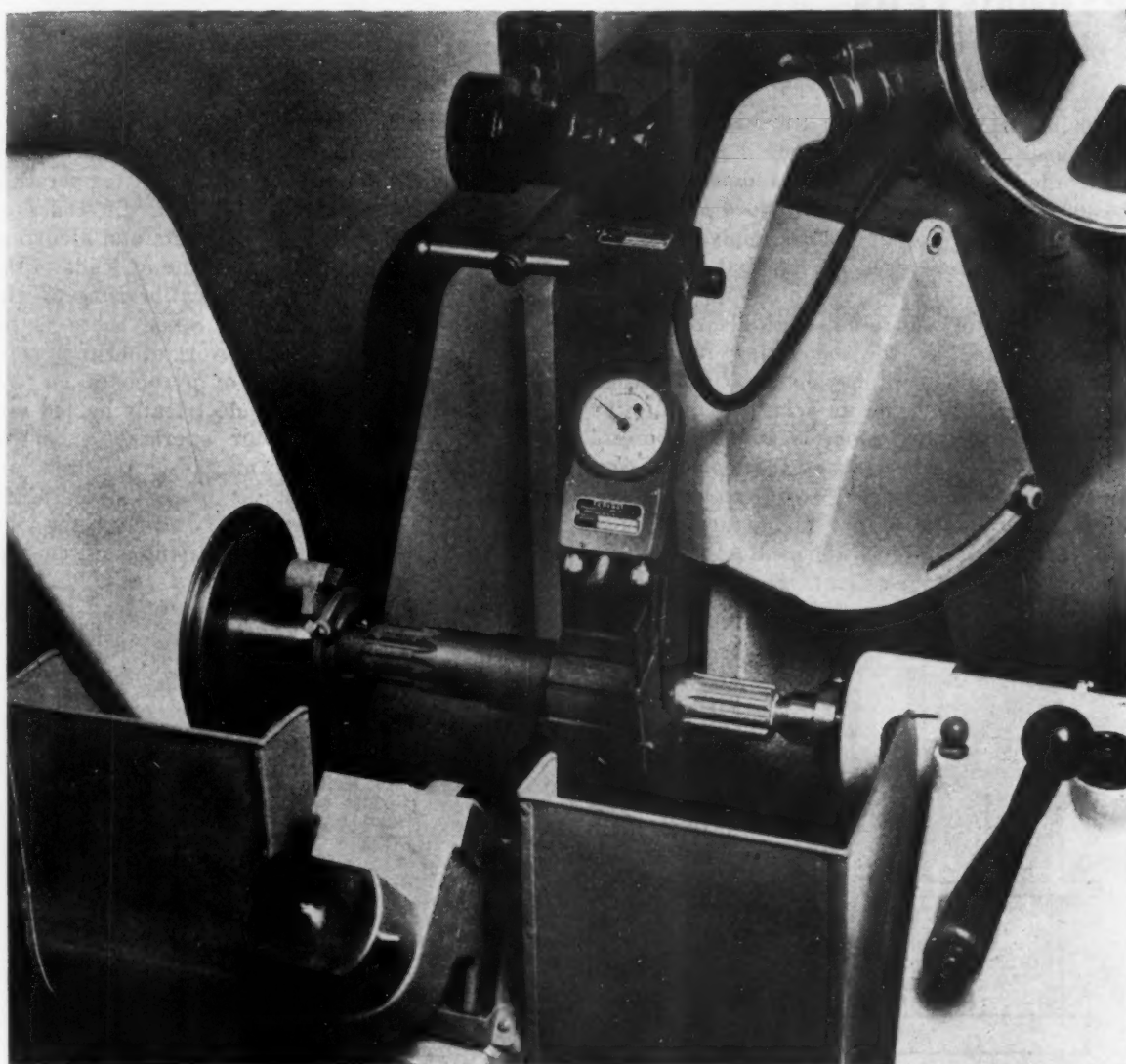
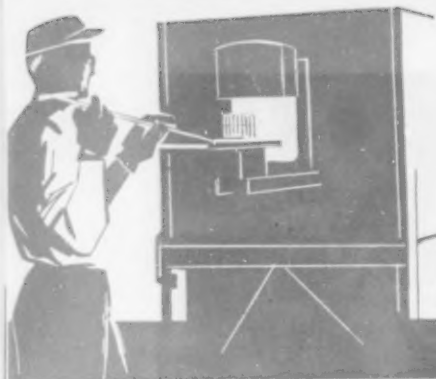


Photo Courtesy Federal Products Corp.

FIG. 11—Automatic gage installed on cylindrical grinder automatically adjusts machine to pro-

duce pieces within size. Accuracy better than 0.00005 is possible.



HEAT TREATING

AUTOMATIC PROCESS CONTROL

- Pyrometers feature more electronic control systems.
- Dew point can be automatically recorded.
- Radiation units grow with induction heating.
- Set a dial for carbon control.
- Atmosphere controls save gas, promote safety.
- Unit sorts by case depth, hardness, analysis, etc.

PYROMETERS:

Trend is to balanced circuits; use of electronic controls growing.

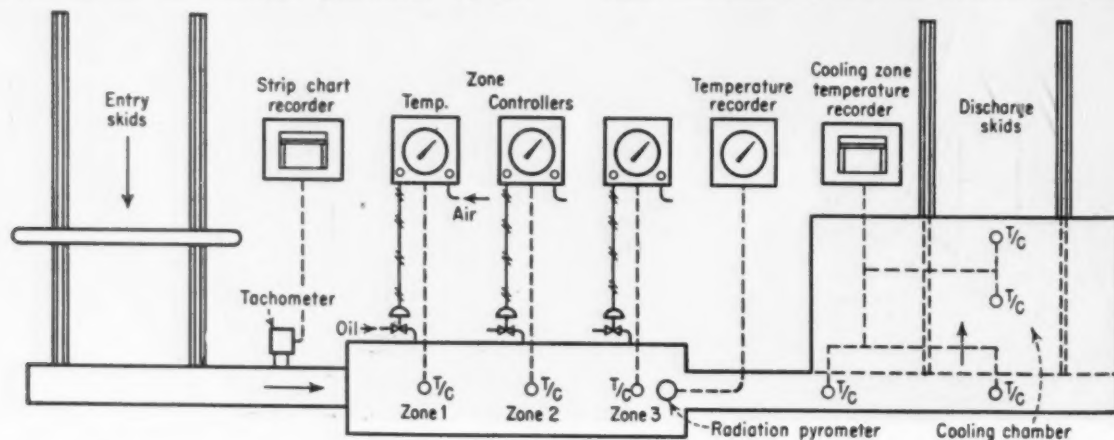
Thermometer controllers are used where temperatures do not exceed 1000 F; pyrometer controllers can be applied to temperatures up to 3000 F. For temperatures to 4000 F and even higher, or where other factors apply, radiation pyrometers can be used for automatic temperature control.

Thermometer controllers with electrical contacts operated by the measuring mechanism will operate solenoid or motor driven valves and pumps, main line switches, etc., through relays. Temperature range is about minus 125 to plus 1000 F. Air-operated thermometer controllers are also available for controlling gas or oil supply to a heat treating furnace; also where steam is the heating medium and water or brine is used as a coolant.

Millivoltmeter pyrometers depend for their movement on the current generated by the

thermocouple (if two dissimilar metals are joined in two places—as in a thermocouple—and if one junction is at a different temperature than the other there will be a difference of potential between the two joints and a current will flow). The resistance value of leads to the thermocouple enters into calibration of the millivoltmeter instrument. Since there is insufficient power to do any work other than moving a pointer, this type of pyrometer may be fitted with a motor. For electrically heated furnace control, the motor operates a control switch to a contactor; on gas or oil fired furnaces it operates a motor or air valve. This is one of the simplest types of pyrometer controllers; it requires practically no maintenance, is relatively inexpensive.

More recent developments, as in so many other instruments, have introduced the poten-



NORMALIZING of steel strip is done here with three temperature controllers which operate

furnace oil valves, plus radiation pyrometer and other recorders.

tiometer system. Here, the electromotive force produced in the thermocouple is balanced against an emf supplied by the instrument. The electromotive force required to bring the system into balance is measured in millivolts. This is a null method; no lead wire resistance is involved because the system is in balance once the pointer stops moving. It is more accurate than the millivoltmeter because all the power required to move the indicator is supplied from a source other than the thermocouple.

There are several ways of using this balancing method. One uses a pivoted galvanometer, which carries the pointer. Contact points on the galvanometer operate a motor to bring the system into balance. In another unit, illustrated here on a brass annealing furnace, the balancing is done electronically. A vacuum-tube amplifier detects voltage unbalance in a potentiometer or a bridge circuit and amplifies it to the value needed to operate the balancing motor. As with any other controller which measures a dc voltage or an electrical impedance, these instruments are also used with radiation pyrometers.

Electrically heated salt baths present an

overshooting problem which simple two position (off-on) control does not always meet. More heat is required at the beginning of the heat-up period, so the heating elements are much hotter than the sensing element (thermocouple or radiation pyrometer) in or on the bath. The heat capacity of the furnace insulation and that of the bath form a dual problem in maintaining close control of bath temperature. Overshooting affects the parts being treated, reduces lining life. One solution to this problem is shown in the accompanying sketch showing a millivoltmeter electronic indicating pyrometer in conjunction with a potentiometer type proportional input temperature controller. The latter controls the salt bath temperature by means of a rotating cam which interrupts the current flow to the heating elements. The length of this interruption is determined by the temperature deviation from the set point. Various cam speeds are tried until experience shows the slowest cam speed which will produce a straight line record. This instrumentation eliminates or minimizes temperature overshoot on the initial heat-up and holds temperature more closely after melting.

RADIATION UNITS:

Applications on rise with growth of induction heating; speed one reason.

Though radiation pyrometry is not new, its use has expanded rapidly during the past few years because of its ability to take fast reading on moving objects. As the accompanying photo shows, the sensing unit is small and easy to mount so as to sight on the part being proc-

essed. Most radiation pyrometers will measure temperatures from approximately 800 to 4000 F. One manufacturer states that when suddenly exposed to radiation from a work piece a reading within 99 pct of true temperature can be obtained in 0.6 sec. If the temperature of the

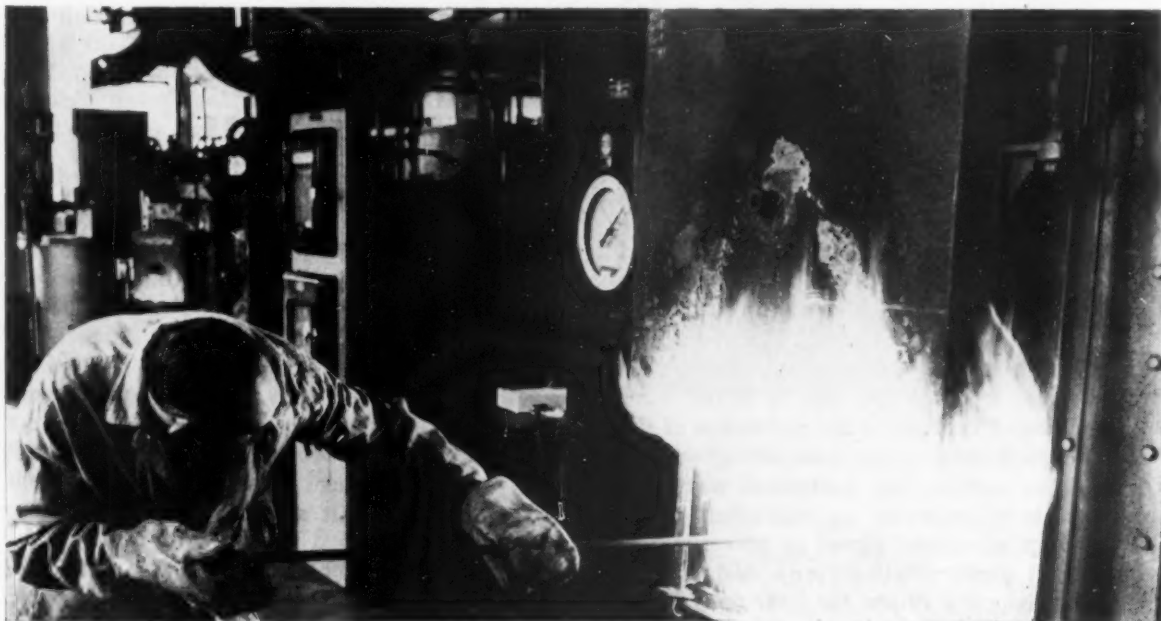


Photo courtesy General Electric Co.

PROTECTIVE ATMOSPHERE FURNACE of box type equipped with flame curtain and controlled

by instruments shown at left of furnace. Operator is removing work from the unit.

work is changing, the temperature indicated by the detector lags only 0.15 sec behind that of the work. The instrument can focus on an opening as small as 0.1 in. between turns of an induction coil. A modified radiation pyrometer will handle temperatures of the order of 3200 to 7000 F.

Much of the recent rise in radiation pyrometry is geared to increasing use of induction heating and flame hardening. There are now more than 10,000 induction heating units in 2500 U. S. plants.

Electronic recorders and controllers, operated by the electromotive force developed by the thermocouple in the radiation pyrometer, will control almost anything required in processing. Temperature can be controlled by turning current off or on or by positioning a rheostat to control power output of a genera-

tor. Or a moving conveyor belt carrying parts through an induction control can be controlled. One of these units (see photo) on an impact forging machine monitors the temperature of jet blade forging blanks being automatically conveyed to the dies. Under-heated blanks are automatically rejected by the unit before they can damage the dies.

Radiation pyrometers are used on all types of furnaces—many have been installed in steel mills—where they sight on a hot object which may be in motion (see photo). They are also used: (1) Where there are space limitations (i.e.) rotary kilns where thermocouples cannot be used; (2) where surface temperatures (roof walls and linings) must be checked; and (3) where rare-metal thermocouples deteriorate rapidly or are corroded, i.e. on high speed salt baths.

DEW POINT:

Key furnace atmosphere indication is now recorded by automatic units.

An important means of controlling heat treating furnace atmosphere is by control of the dew point. While this is often done manually it is now possible to do the job with automatic equipment. As installed in a number of plants, the instrumentation uses a humidity sensitive cell to which a minute flowing sample of gas from the furnace is piped. This senses the dew point temperature to within plus or minus 1° C. One pen records dew point, another records ambient gas temperature. Two such units are illustrated in the accompanying photo.

GAS ANALYSIS:

Balanced electrical bridge circuit permits accurate atmosphere control.

Certain types of combustion gas analyzers draw a sample of the atmosphere into an analysis cell, passing it over one of two heated sensitized platinum filaments making up the detecting unit. A second platinum unit, sealed in a reference cell, acts as the compensator, both units forming part of a balanced electrical circuit. When combustible gas is drawn over the hot filament it changes the resistance of the circuit in proportion to the amount of combustibles in the sample. The amount of electrical unbalance is measured by an indicating meter. And once an electrical signal is present, controllers will perform almost any desired job, such as positioning valves for hydrogen, nitrogen, etc. This type of device also protects against explosive mixtures. Another way of controlling furnace atmospheres is by specific gravity (see next page under "Safety.")

CARBON CONTROL:

Uniform atmosphere and temperature maintained with automatic control.

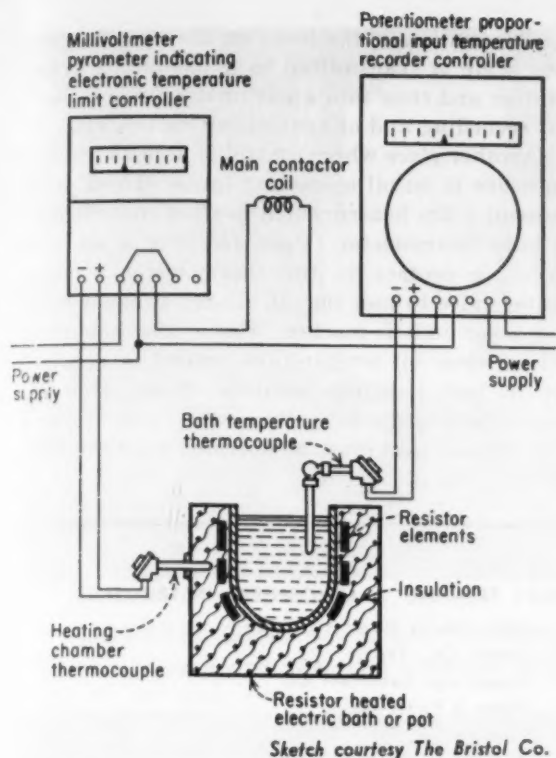
A great many heat treaters are now using automatic carbon control integrated with temperature control. A "packaged" unit with this manufacturer's furnace, it operates between 1500 and 1750 F for hardening, case carburizing, homogenous carburizing or carbon restoration. Carbon range is 0.15 to 1.15. Setting a dial maintains the furnace atmosphere. An alloy steel detector in the furnace reacts to furnace atmosphere the same as the steel being treated; as its carbon content changes, its resistance changes. The result is recorded and carbon content of the atmosphere is controlled by adjusting fluid flow to the furnace. The accompanying photo shows this instrumentation in a plant heat treating aircraft gears.

IF BURNERS FAIL:

Multiple burner protection afforded by photocell units sighted on flame.

Industrial ovens and furnaces fired by multiple burners can be protected against flame failure. One type of unit detects flame failure at any burner by an individual relay. Photocell or flame-electrode detector units are sighted on each burner. These units recognize the presence of flame only when an electronic tube is fed a rectified current, which energizes the control relays. Flame failure or electrical failure shut off all valves. Unit also has a built-in purge timer.

In this unit a photo electric cell is usually used on oil flames, taking advantage of the fact that the cell is a natural rectifier. Light from the flame on the cell produces rectified current from the applied alternating current. An electrode in the flame is used for gas.



SALT BATH temperatures which may overshoot during heating-up period can be held more closely with proportional input controller, giving virtual straight line record.

PRODUCTION SORTING:

Unit sorts on basis of case depth, analysis, hardness, brittleness, etc.

An automatic sorting unit which will handle up to 300 pieces a minute uses an oscilloscope signal in conjunction with a test coil. Any single variation in properties of material passing through the coil will produce a signal. With suitable parts feeding equipment, the instrument will handle 5 small pieces a second; one a second is fair for medium size pieces. Factors which heat treaters must often check, and which this unit will use as a basis for sorting include: Analysis, structure, hardness, case depth, depth of decarburization, brittleness, amount of cold working and internal stresses.

If, for instance, the object is to select parts falling within a specified hardness range, the sorter relays are adjusted to operate the sorting device only when the instrument readings are within acceptable limits. Above or below the acceptable range no signal is sent out.

SAFETY DEVICES:

Gas analyzers assure safe furnace purging, reduce downtime, save gas.

Although safety devices are now built into many automatic controls, there are a number

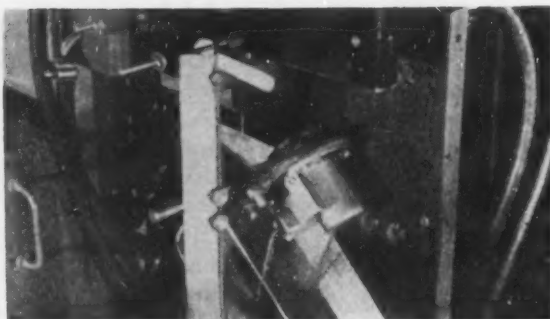


Photo courtesy Leeds & Northrup

RADIATION PYROMETER reads temperature of induction heated forging blank on conveyor of Chambersburg Impacter within 0.6 sec., rejects underheated blanks.



Photo courtesy Minneapolis-Honeywell

IN FURNACES AND MILLS, radiation pyrometers take readings of hot objects in motion, start or stop conveyors, for correct product temperature before next operation.

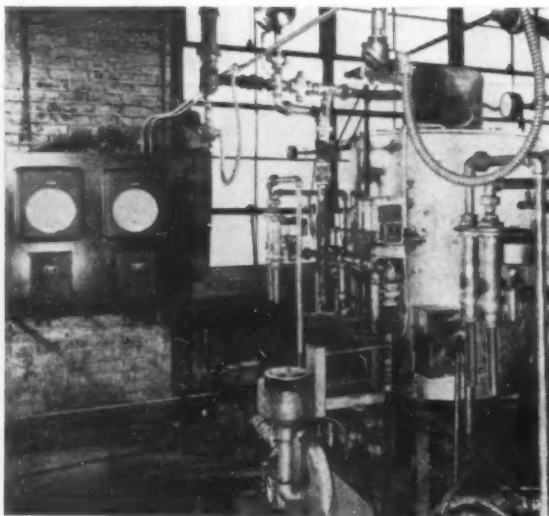


Photo courtesy The Foxboro Co.

DEW POINT recorders automatically monitor moisture content of gas in heat treating and carburizing furnaces at Whitney Chain Co., Hartford, Conn., plant.

of units which have been installed primarily to monitor atmospheres for explosive concentrations. If atmospheres approach the explosive range they either adjust valves or stop gas flow.

Several types operate on the heated filament principle—are actually gas analyzers of the type described above but are used in some plants simply as safety devices.

A device widely used for purging controlled atmosphere furnaces is now being teamed with a recorder-controller to measure and control furnace atmospheres as well. Heart of the indicating portion of this meter is a specific gravity measuring unit. This contains twin rotating impeller fans which constantly analyze a sample of gas and air and register the torque difference on a specific gravity scale. This takes advantage of the fact that various gases—from carbon dioxide to ammonia—have different specific gravities.

Manufacturers

Manufacturers of the type of automatic control equipment described in this section include:

PYROMETERS:

Bacharach Indus. Inst. Co.
Bailey Meter Co.
Barber-Colman Co.
Bristol Co., The
Burrell Corp.
Cambridge Instrument Co.
Foxboro Co., The
Illinois Testing Labs.
Leeds & Northrup Co.
Minneapolis-Honeywell
Partlow Corp.
Roller-Smith Co.
Taylor Inst. Cos.
Thwing-Albert Instrument Co.

The motion of the lever on the specific gravity scale is transmitted to a pneumatic transmitter and thus into a pneumatic force capable of recording and of controlling valves, etc.

Another place where control is used as a safety measure is on oil quenching tanks. These tanks present a fire hazard which is often controlled by a bulb thermometer. Upon reaching a set high point, a contact in the thermometer opens a water valve to cool the oil, closing it again when the lower limit is reached. This is also important where close oil temperature control is required in the heat treating operation. Some shops are also replacing alarm systems with automatic control where tanks must be operated near the flash point of the oil.

HEAT TREATING & ATMOSPHERE INSTRUMENTS:

Bailey Meter Co.
Bristol Co., The
Cambridge Instrument Co.
Fisher & Porter Co.
Foxboro Co., The
General Electric Co.
Hagan Corp.
Hays Corp., The
Illinois Testing Laboratories
Leeds & Northrup Co.
Minneapolis-Honeywell Regulator Co.
Permutit Co.

SORTING UNIT:

J. W. Dice Co.

Note: This list includes only manufacturers of furnace instrumentation. It is not a list of manufacturers of furnaces, atmosphere generators, etc.

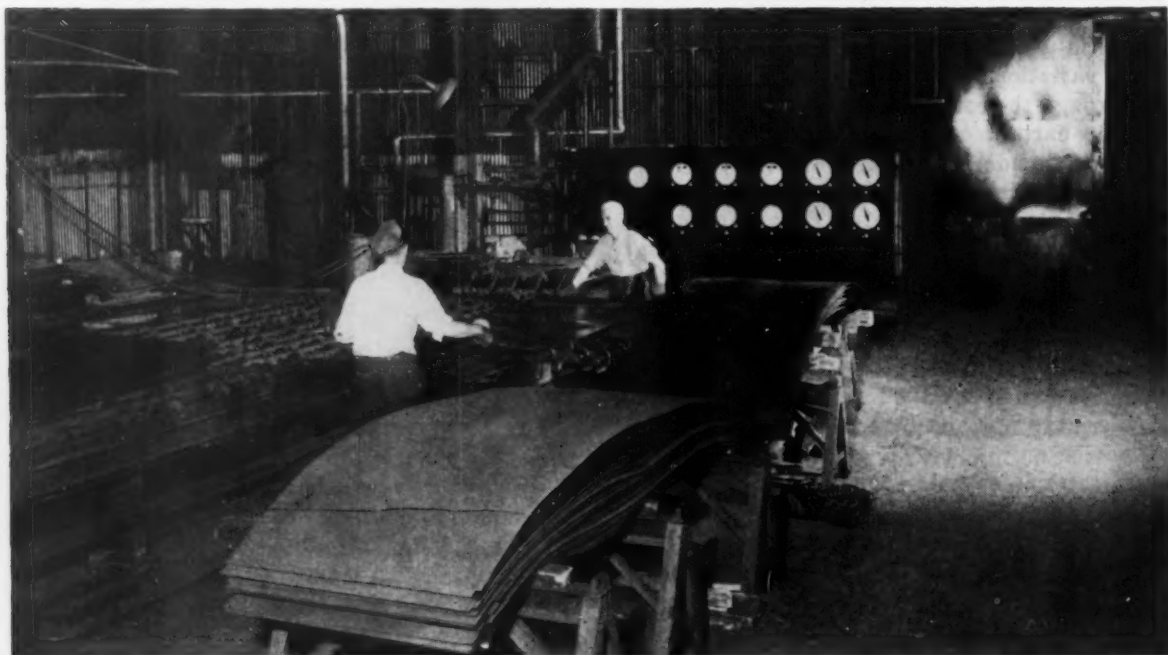


Photo courtesy Minneapolis-Honeywell

PANEL BOARD, background, provides recorders and controllers for heat treating furnace han-

dling stainless steel sheets at Welland plant of Atlas Steel Co., Ont.

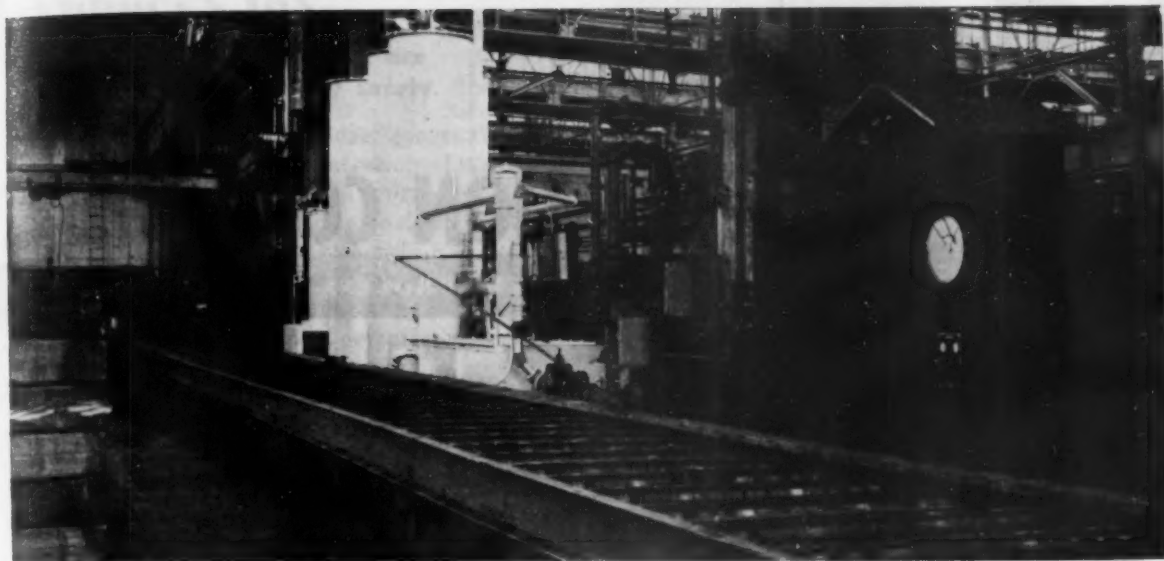


Photo courtesy Bailey Meter Co.

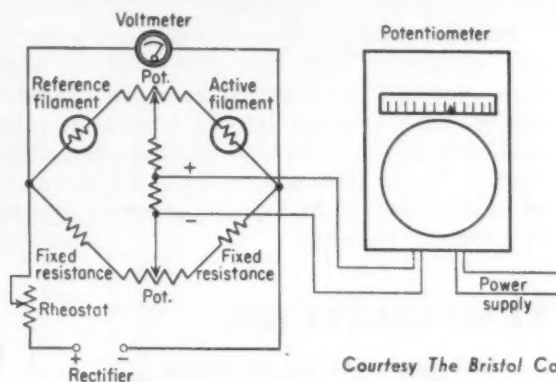
ATMOSPHERE GENERATOR, left, for electric furnace in cable and wire plant is automatically

controlled from panel at right. Analyzer controls protective atmosphere.



Photo courtesy Leeds & Northrup

CARBON AND TEMPERATURE are automatically maintained in these furnaces treating aircraft gears. Operator simply presets temperature and carbon controls.



Courtesy The Bristol Co.

GAS ANALYZER circuit used in several instruments shows how atmosphere varies resistance on part of bridge circuit while potentiometer measures current to restore it.

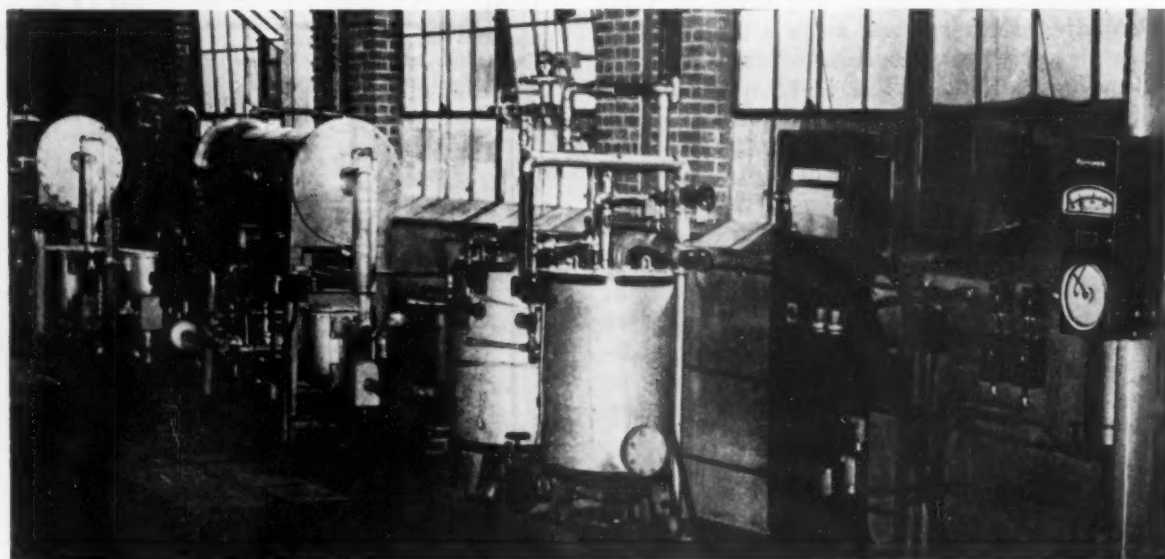
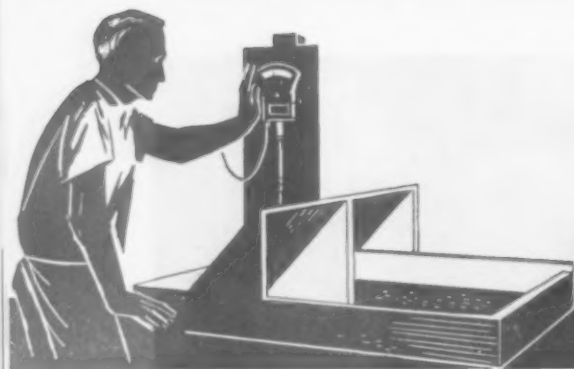


Photo courtesy The Permutit Co.

SPECIFIC GRAVITY of different gases is operating principle in this unit, extreme right, which

can automatically control furnace atmospheres, assure safe purging.



SOLUTION CONTROL

AUTOMATIC PROCESS CONTROL

- Save time, free your men with solution control.
- Let automatic units cut that fuel bill.
- Improve plating efficiency, bring down costs.

LIQUID LEVEL:

Integrated automatic controls are key to low-cost solution handling.

Solution control is of prime importance to any successful tank operation—plating, pickling, washing, or degreasing. Basic chemical concentration is often directly affected as solution volume rises or falls in the tank. Automatic controls in the plating room are more and more recognized as key factors in improved plating efficiency and quality.

Automatic control starts with regulation of the liquid level in the tank. A pressure type liquid level gage may be used. Pressure at any point in a body of liquid is a measure of the height of liquid above that point. This fact is used in measuring height of liquid in open tanks. Connected to suitable liquid level controllers, these units automatically maintain solution at the proper level.

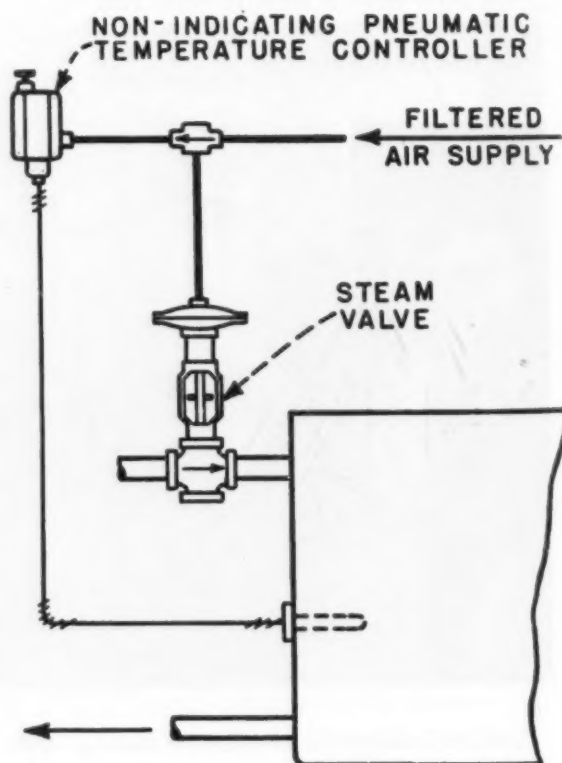
TEMPERATURE:

**Cut excessive use of steam . . .
Improve cleaning operations.**

Equally important to successful plating operation is the close control of solution temperature. Excessive temperatures usually result in increased use of steam and waste of fuel. Subnormal temperatures, as in a typical alkaline cleaning tank, may lead to unsatisfactory cleaning. Solution to this problem lies in use of automatic temperature controlling equipment. A typical and simple installation is the remote bulb air-operated temperature controller. A suitable unit covers a range of 105° to 220° F. Operating with a pneumatic temperature controller and a suitable steam valve, the unit eliminates the need for manual operation. Bath temperature is held at the desired level without attention from the operator. With modifications, units of this type may be adapted to control of cooling as well as heating of the tank.

Sketch courtesy Minneapolis-Honeywell

HOT ALKALINE CLEANING depends for effectiveness on maintenance of correct bath temperature. Remote bulb air-operated unit controls diaphragm steam valve.



HYDROGEN-ION:

pH of industrial solutions are constantly guarded for safety.

Some solutions require close, constant control of hydrogen-ion concentration. Improved pH control often minimizes corrosion difficulties, decreases maintenance costs and eliminates the possibility of contamination of water supplies from plant waste disposal. By the electrometric method, output from an electrode cell is amplified to operate a potentiometer-type recording instrument. Linked with a suitable control unit, the system automatically rectifies pH solution concentration.

DEGREASING:

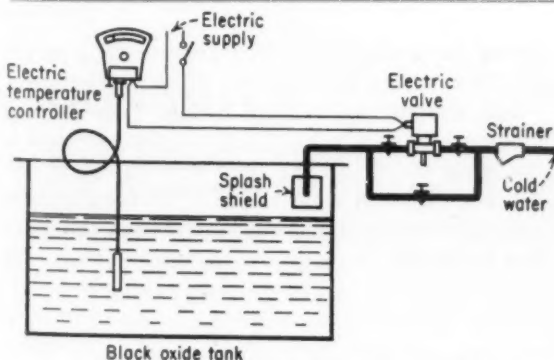
Better vapor control cuts costs, reduces health hazards.

Improved cleaning efficiency, lower cleaning costs and reduction of health hazards have resulted from application of continuous automatic controls to degreasing operations. A dual temperature controller regulates both the temperature of the water in the tank cooling coils and the amount of heat applied to the boiling liquid solvent.

When the vapor level falls, the controller responds to a reduced vapor atmosphere temperature, opening a steam valve to add heat to the solvent and increase vaporization. When the level of the hot, 188° F, vapor rises, as with a small work load, the steam valve is closed to decrease vaporization and return the vapor zone to its proper level. Temperature of the water in the condensation jacket is also automatically held at a fixed point.

Manufacturers

The following are among the manufacturers of the types of automatic control equipment described in this section: Beckman Instruments, Inc.; The Bristol Co., Fischer & Porter Co., The Foxboro Co., Leeds & Northrup Co., Minneapolis-Honeywell Regulator Co., Industrial Div., Sarco Co., Inc., Taylor Instrument Co., U. S. Galvanizing & Plating Equipment Corp.



Sketch courtesy Sarco Co., Inc.

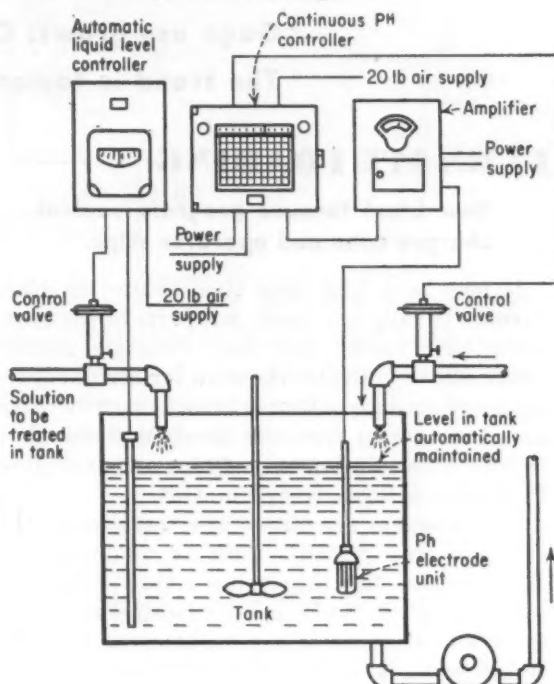
BLACK-OXIDE FINISHING is improved through improved control of chemical concentration and boiling. Water valves are automatically activated on temperature changes of $1/2^\circ\text{F}$.

BLACK-OXIDE:

Chemical concentration held constant, operation improved.

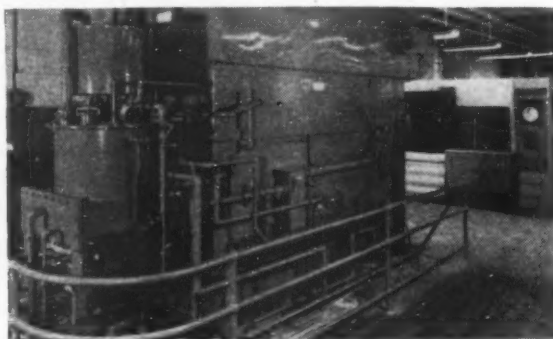
Black-oxide finishing is an example of application of relatively simple automatic controls to guard finishing quality. The process uses a chemical and water solution operated at a specific boiling point. Since the solution is worked at temperatures between 290° and 350° F, evaporation of water as well as dragout tend to reduce the percentage of water in relation to the chemical. When this happens, the solution boiling point rises and water must be added.

An indicating temperature controller actuates a switch on temperature changes of $1/2^\circ\text{F}$. Water is added immediately as needed to minimize interruption of boiling.

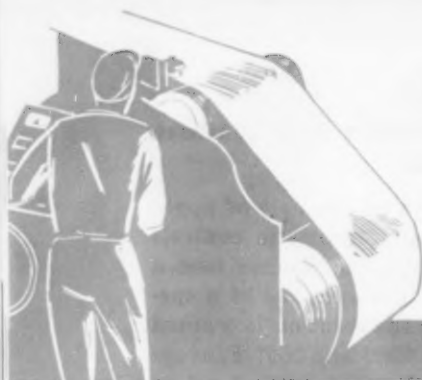


Sketch courtesy The Bristol Co.

MONITORING of hydrogen-ion concentration is necessary in handling some industrial solutions, especially where effluent may pose serious stream pollution problem.



MORE PARTS ARE CLEANED faster and better through application of automatic controls on this Blakeslee degreaser at the Foxboro Co. Secret is dual temperature control.



MELTING & ROLLING

AUTOMATIC PROCESS CONTROL

- Approaching the automatic furnace.
- Automatic reversal, pressure control pay.
- Newer pits and controls save 60 pct.
- Direct readers cut analysis time to 4 minutes.
- Gage use grows: Contact, X and beta ray.
- The trend is toward more integration.

FURNACE LOADING:

New blast furnace program control charges coke and operates skips.

It may be a long, long time before the blast furnace is fully automatic but parts of the operation have moved this way. Program control which either indicates the need for certain operations or actually initiates them is used on three new furnaces at Crucible Steel, Midland, Pa.; Detroit Steel, Portsmouth, Ohio; and Dominion Foundries & Steel, Hamilton, Ont.

Coke hoppers are placed at either side of the skip pit (see sketch). Coke is automatically charged into the skip using either weight or volume control. While coke is being discharged the scale car operator can load the car with ore or limestone, avoiding what was once a bottle-

neck. A panel located high enough so that only the scale car operator can work it indicates to him the position of the skips, furnace stock level and the next item due to be charged. Once he dumps his car into the skip pit, a push button starts the skip, accelerating it at the start, decelerating as it approaches the dumping horns, and stopping in discharge position.

The idea is to coordinate the whole charging operation so things take place at the proper time, in the proper sequence and in the proper amounts. With this system, one or at the most two, operators can do the entire charging operation.

HOT BLAST CONTROL:

Air temperature held within 3 to 5 F for more uniform iron analyses.

Control of hot blast temperature provides close, dependable control of hearth temperature, which affects carbon silicon, manganese and sulfur content of the iron. Prevention of overheating also increases furnace lining and tuyere life. A control system now used for this purpose holds hot blast temperature to within 3 to 5 F of the set point, limits temperature variation

during stove changes to 25 F, returning it to the set point within 3-5 minutes of stove change.

The control mechanism design (see sketch) considers two points: (1) Stove temperature is changing slowly all the time it is on blast; and (2) when a fresh stove is cut in its temperature is several hundred degrees higher than the stove just taken off.

OPENHEARTH CONTROLS:

Automatic pressure and combustion units save fuel, increase production.

Automatic control can be applied to open-hearth furnaces in half a dozen places. Principal applications are to control furnace pressure,

combustion and reversal. Properly applied, fuel savings of up to 10 pct are conservatively reported, charging time is shortened, tap to tap

time reduced, refractory costs lowered and there are fewer delays per heat.

Pressure control ranks at the top of the list because of the difficulty of carrying a positive pressure at all points of the furnace. Too low a pressure permits air to infiltrate through the brickwork instead of coming through the checkers. Too high a pressure will ruin the roof. So for top efficiency it requires automatic control to maintain a pressure on the roof as high as safety permits.

A leading manufacturer uses two impulse lines to maintain a constant differential between the inside and the outside of the roof. Through this control a variation of 0.001 in. of water operates water cooled dampers weighing several tons.

Combustion control is virtually a "must" in most openhearth, since they are fired with combination fuels (e.g. gas and oil). But much dependence on sensing or indicating instruments with manual control is now being replaced with automatic equipment which pays for itself in more efficient use of fuel. It also reduces the possibility of damage to the metal being heated and the danger of overheating refractories.

Automatic reversal is a newer development. One of the principal makers of furnace control equipment supplies an electrical hydraulic system which automatically shuts off fuel, reverses the fuel valves, purges the checkers, reverses the dampers and resumes the fuel flow. Types of valves and positioners (pneumatic, electric motor driven or hydraulic) used in furnace control systems vary according to the manufacturer, the fuel to be handled or the object to be moved.

One problem is supplying oxygen to an openhearth, as it is in scarfing, is erratic flow. It may vary from full flow to nearly zero in a matter of seconds. One solution is use of a pneumatic electric flow meter which actuates a flow regulator to smooth out delivery. Fire hazard is eliminated in this meter by restricting oxygen to lead lines and a small measuring chamber.

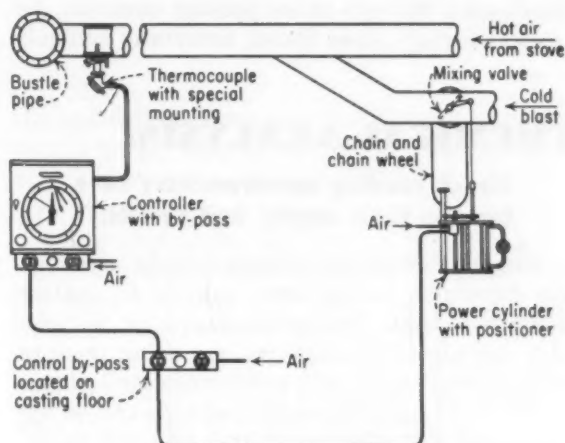
SOAKING PITS:

Newer pits plus automatic controls have halved steel mill fuel needs.

Development of several new types of soaking pits plus installation of automatic controls have reduced the fuel used for ingot heating by from 50 to 60 pct in the past 20 years. Newer instrumentation with more accurate sensing and response is expected to chalk up further gains in the next few years. Furnace temperature and atmosphere control are the critical factors that lead themselves to automatic control. They add up to savings in fuel, in fixed charges in rolling time and furnace maintenance.

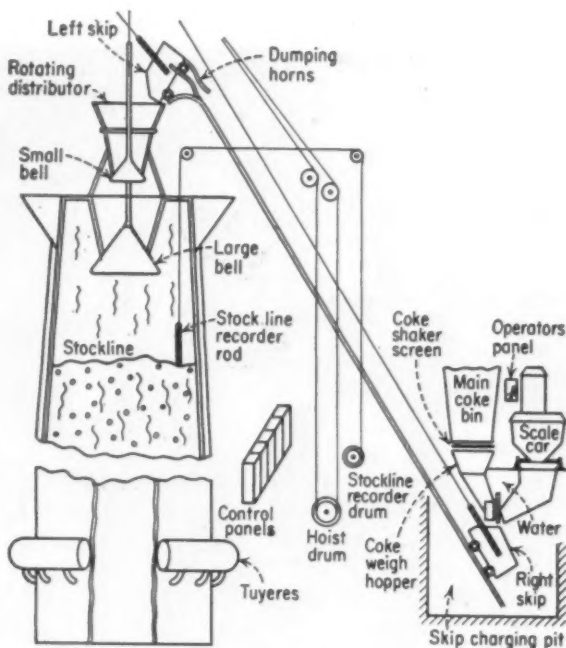
Furnace pressure is regulated by positioning of the stack damper. The fuel-air ratio can be controlled by a valve in the air line. One arrangement for doing this is shown in the accompanying schematic drawing of a recuperative soaking pit equipped for premixed gas. In this case the fuel is coke oven and blast furnace gas.

A recent development provides a means of summarizing the air requirements for combined fuels. This permits a better distribution of fuel throughout the plant. In addition, where stand-



Sketch courtesy Minneapolis-Honeywell

BLAST AIR temperature is held within close limits by arrangement using potentiometer and pneumatic proportional control unit on this system with a single mixing valve.



Sketch courtesy General Electric Co.

BLAST FURNACE charging is more nearly automatic with this arrangement now used on three American furnaces. It cuts charging manpower needs approximately in half.

by fuel is used, it too can be metered without making any adjustments to the ratio regulator.

Controllers fitted with plastic or sheet metal cams will maintain any predetermined sequence of temperatures on heat treating furnaces. Cams can easily be cut to change temperatures and sequences. Since heating cycles differ for various types of steels, the decision on changing temperature is no longer left to an operator looking through a peephole. "Step heating" of alloy steels, where they are held for a period to equalize heat throughout the ingot, is easily duplicated through these present controls. An accompanying photo shows automatic controls

installed at U. S. Steel Co., Duquesne Works.

A new reversing control for regenerative furnaces is now available. It is a combined temperature recorder and temperature difference controller designed for fast, accurate reversal. It continuously records checker temperatures, simultaneously measuring the temperature difference between regenerators and either warns that reversal is due or automatically reverses when a pre-set difference is reached. It draws a two-point line with the width of the recorded band between the lines showing temperature differential. The photo captioned "Integrated Control" shows some of these units.

CHEMICAL ANALYSIS:

Direct reading spectrometers save furnace time, supply fast results.

Direct reading spectrometers make a fantastic difference in the time required to analyze samples of heats. Production foundries, automotive and aircraft companies, are using them as well as steel mills and nonferrous melt shops.

Wherever spectrographic methods can be applied and a routine analytical program established on a reasonably large volume of work in a production control laboratory they can increase production, cut analytical costs. Results are usually more accurate than wet chemical tests.

Using figures cited by one manufacturer of a direct reading unit, a chemist on a certain type of analysis averaged 1.85 determinations

per hr. With the new unit he makes 42.50 per hr. The unit offered by this manufacturer makes an inked record on a chart such as the technician is marking in the accompanying photo. Carbon copies can be had, too. In general, trace elements of analytical interest can be measured down to 0.0001 pct of the amount present. Boron in steel, for example, can be measured down to 0.0005, phosphorus down to 0.01 pct.

Another manufacturer furnishes a unit on which the analysis appears on charts, one for each element. A technician at Republic Steel is shown putting samples into one of these units in the accompanying photo. Production figures at Republic's Massillon plant for a typical month

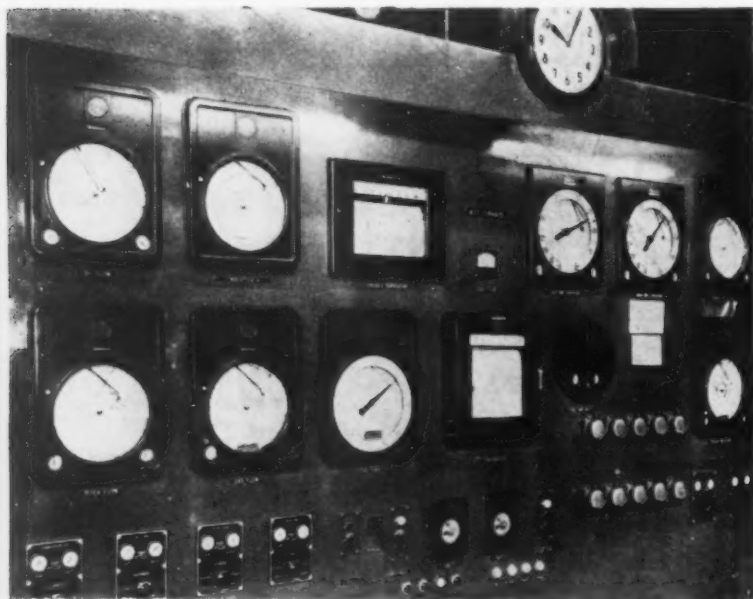
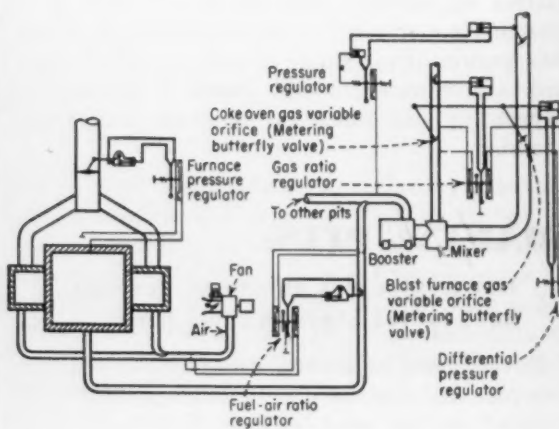


Photo courtesy Bailey Meter Co.

AUTOMATIC CONTROL PANEL for an open-hearth has meters to record around-the-clock performance, set up impulses to maintain efficient operations.



Sketch courtesy Askania Regulator Co.

RECUPERATIVE SOAKING pit for premixed gas. Blast furnace and coke oven gas are mixed, then boosted in pressure for the burners.

show that for 19,364 analyses during one month, 2529 man-hours would have been required to analyze them in the chemical laboratory. The direct reading spectrometer required only 500 hours. The chemical control of nine open-hearths, including at least three preliminary tests as well as final tests for each heat, certainly is not the limit of capacity of the instrument, the Republic spectrographer says. With

THICKNESS GAGES:

Contact, X and beta ray instruments now control many rolling operations.

Faster production, less rejects and a more accurate and uniform product are the reasons why more and more automatic gaging is being applied to rolling steel, brass, aluminum, foil, etc.

Variations in thickness to 0.0001 in. are easily indicated and mill rolls can be automatically adjusted to bring strip back to specification. The problem, which has taken years to solve, was "hunting." This has now been overcome in continuous gaging by "inching" the screwdowns to bring the strip on gage and avoid over-correcting, followed by under-correcting, or hunting.

Two general types of gages are available. The original contact gage and the more recently developed non-contacting gages. The latter are either comparators or X and beta ray units. For automatic control these various gage units have four parts: The gage head, the power unit,

favorable conditions he feels the production figure could be doubled with the same crew.

For melting control these units take solid samples cast in pin molds in the melt shop. They are usually sent by pneumatic conveyors to the laboratory. Four minutes (in a steel plant) after the sample is received the analysis can be Tele-autographed to the melt shop. The savings in furnace time are obvious.

the indicating meter and the screwdown control. It is not unusual to find both contact and non-contact gages on the same line. The precision stainless steel mill shown in the accompanying photo uses one of each type. Strip on this mill starts at 0.125 in. thick. Since the beta ray gage measures only up to about 0.030 in. thick the contact gage is used until the former takes over. On very thin stock the beta ray gage is somewhat more accurate, detects thickness variations of a few millionth of an inch.

The tinplate line is a nice example of automatic control. In the photo shown here the beta gage classifies and sorts tinplate after rolling. After the tinplate passes the gage it is cut by a flying shear. If a portion of the strip cut is off gage a delayed signal from the gage operates a gate further down the line to separate the off-gage from the acceptable sheets. Similar con-

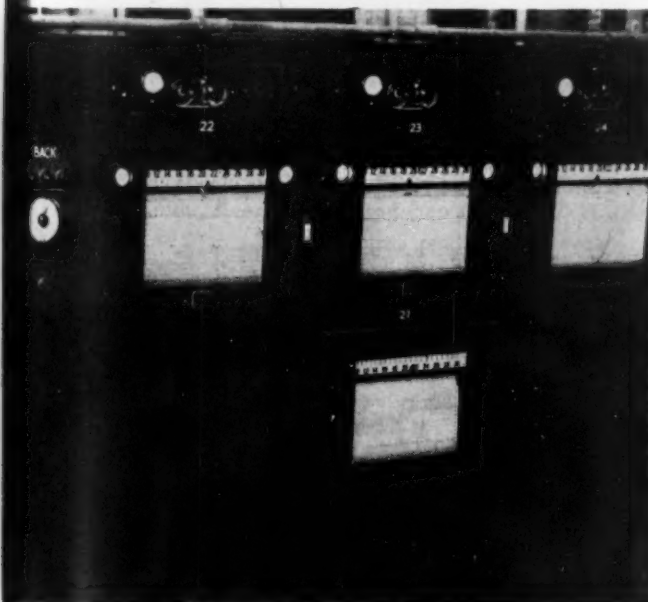


Photo courtesy The Bristol Co.

ELECTRONIC air-operated controlling pyrometers work automatically to control regenerative soaking pits. Platinum platinum-rhodium thermocouples are at pit covers.

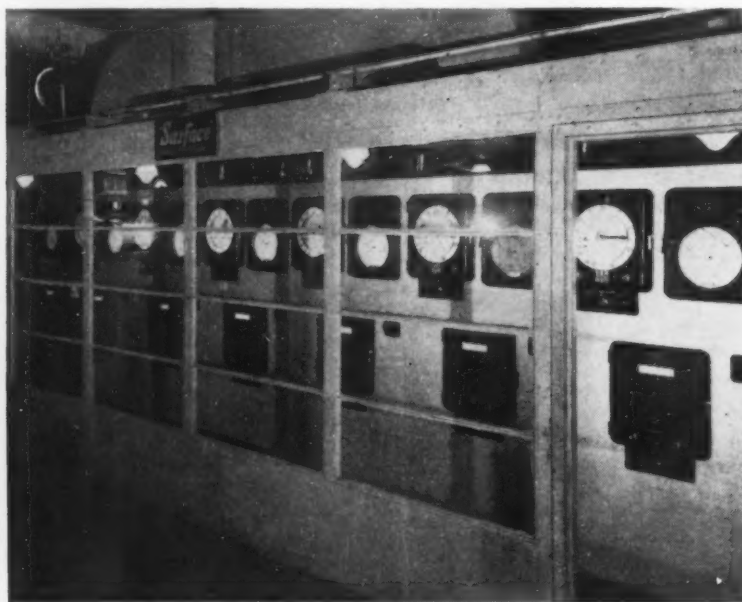


Photo courtesy Leeds & Northrup

INTEGRATED CONTROL and centralization of instruments is a definite trend. This panel contains all controllers for six soaking pits at a midwestern steel plant.

trols will also sort into acceptable, heavy and light. This line is also equipped with an automatic pinhole detector.

Beta gages, which are usually powered by a minute amount of radioactive strontium 90, are also available as "backscatter" gages which measure from only one side the thickness of coating on many types of base materials or the thickness of sheets passing over a roll. The dia-

grams, opposite page, show how these work.

X-ray gages, now powered with new type X-ray tubes costing up to 75 pct less, are in use on a score of hot and cold steel strip mills, aluminum mills, tinplate lines, etc. One model handles cold strip steel up to 0.40 thick, another will handle hot strip up to 0.420 thick. The same manufacturer makes an X-ray gage for foil down to 0.0005 in. thick.

WIDTH GAGES:

Hold dimensions on flat wire, units also used on wire extruders.

Narrow strip in widths to 2 in. can be gaged and its width continuously controlled with a contact gage. Hardened steel rollers contact the

strip and variations in width are electrically magnified. Where automatic control is desired these signals act to control the vertical rolls of

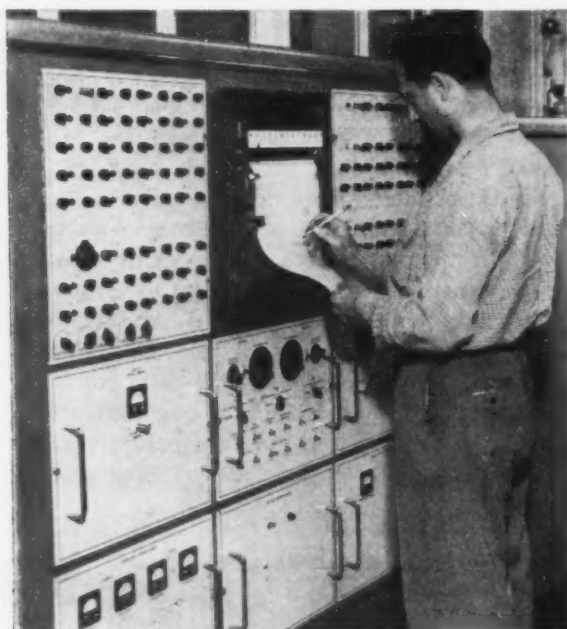


Photo courtesy Applied Research Laboratories

PRODUCTION CONTROL QUANTOMETER at Pratt & Whitney Aircraft is 30 times faster than wet chemical analysis method. Accuracy is usually better too.

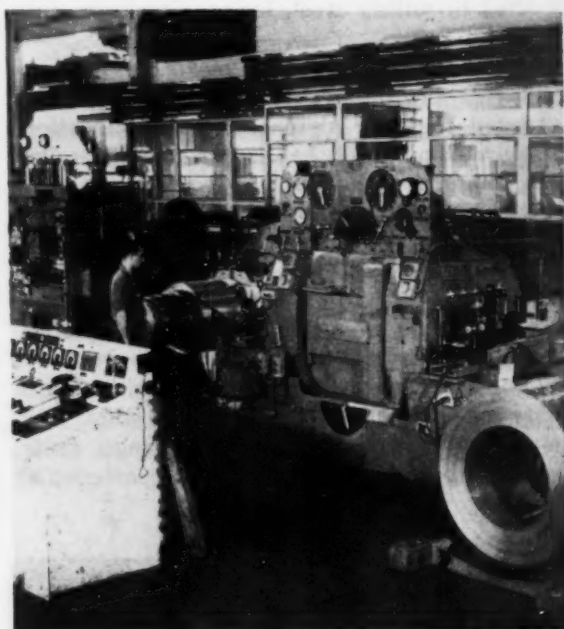


Photo courtesy Pratt & Whitney

SENDZIMIR cold mill at Wallingford Steel Co. is equipped with latest in controls, including two sets of contact and beta ray gages to maintain accuracy in rolling stainless strip.



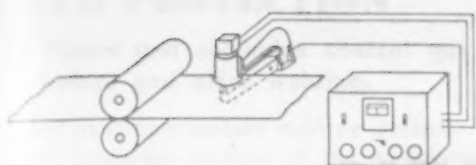
Photo courtesy Baird Associates

OPERATOR puts 7/32 in. pins in Direct Reading Spectrometer as self-electrodes. Arc will produce spectrum showing presence and amounts of elements in sample.

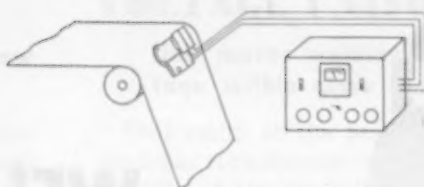


Photo courtesy Pratt & Whitney

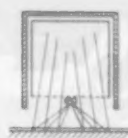
TINPLATE LINE at Jones & Laughlin's Aliquippa Works uses beta ray gage, pinhole detector (right of gage), and automatic sorter. Gage will "mike" sheet at 3000 fpm.



Typical application of absorption gauge



Typical application of backscatterer gauge



Backscatterer principle

Sketch courtesy Tracerlab, Inc.

USUAL BETA RAY gage application is that shown at left. Backscatterer gage is used where

both sides of material are hard to reach, also for measuring coating thickness.

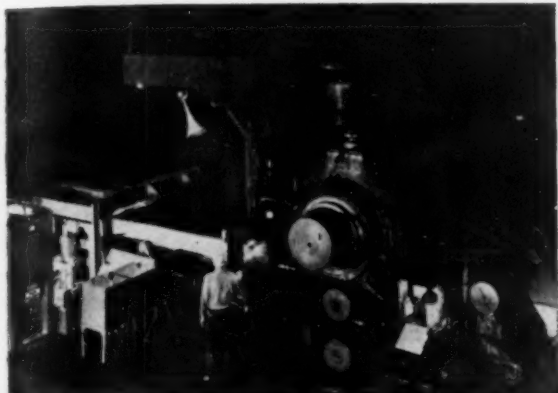


Photo courtesy The Sheffield Corp.

HOT STRIP MILLS for ferrous and nonferrous metals use X-ray gages to check and control strip thickness. Speed and temperature (hot or cold strip) don't affect accuracy.

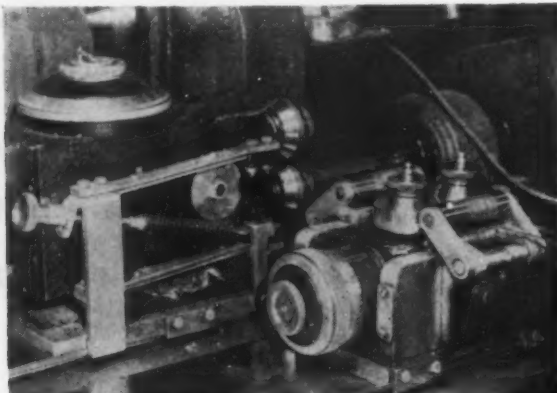


Photo courtesy Pratt & Whitney

WIDTH GAGE of the contact type used mainly in rolling flat wire will automatically adjust vertical mill rolls. Another use is for the control of round wire diameter.

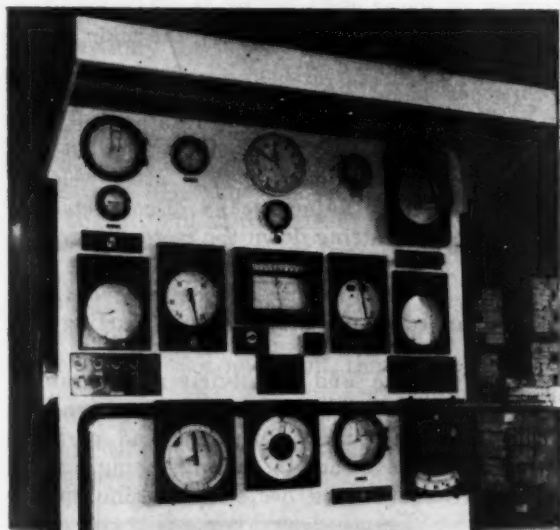


Photo courtesy Minneapolis-Honeywell

OPENHEARTH CONTROL is probably the most completely instrumented phase of steelmaking. Note variety of controls on this openhearth cubicle in a large Eastern mill.

the mill. Details are shown in the close-up photo. Primary use is in making flat wire.

As a variation of this gage, several companies make contact gages to control the diameter of wire coatings applied by extruders and beta ray gages are now being offered for this job, too. Cost savings run to 10 pct.

Manufacturers

Manufacturers of the type of automatic control equipment described in this section include:

FURNACE TEMPERATURE CONTROLS:

See listing in "Heat Treating" section.

FURNACE PRESSURE AND COMBUSTION CONTROLS:

Askania Regulator Co.
Bailey Meter Co.
Barber-Colman Co.
Bristol Co., The
Cambridge Instrument Co.
Eclipse Fuel Engineering Co.
Foster Engineering Co.
General Electric Co.
Hagan Corp.
Hays Corp.
Leeds & Northrup Co.
Manning, Maxwell & Moore, Inc.
Mason-Neilan Regulator Co.
Minneapolis-Honeywell Industrial Division
Photoswitch, Inc.
Republic Flow Meters Co.
Taylor Instrument Co.

DIRECT READING SPECTROMETERS:

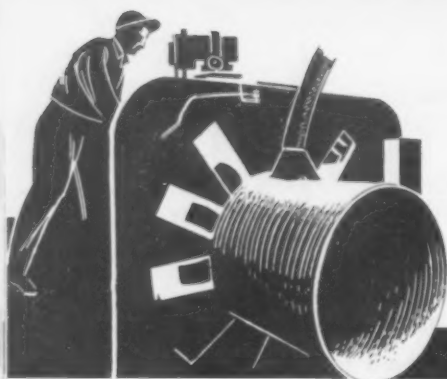
Applied Research Laboratories
Baird Associates, Inc.

ROLLING THICKNESS AND WIDTH CONTROLS

Federal Products Corp.
General Electric Co.
Pratt & Whitney Div., Niles-Bement-Pond
Sheffield Corp., The
Tracerlab, Inc.

BLAST FURNACE PROGRAM CONTROL:

General Electric Co.



WELDING

AUTOMATIC PROCESS CONTROL

- Voltage controls aid weld uniformity.
- Delay timers eliminate weld-zone contamination.
- Switch prevents overheating.
- Special controls actuate pneumatic head.
- Automatic arc starting speeds welding production.

NO-LOAD CONTROLS

Provide safety and convenience plus saving power.

Making things better is a goal of industry which keeps it searching constantly for new methods and devices. This is particularly important in manufacturing processes involving many variables, all of which must be controlled accurately and automatically. Welding processes exemplify this well since their success to consistently produce sound, uniform welds depends on the degree to which they can be controlled automatically.

Quality, size, length, shape and other properties of welds are most frequently controlled by regulating devices in the circuits or lines supplying the essential services such as current, gas, filler metal and water. In addition, these devices eliminate inconsistencies due to the human element. Other devices are designed primarily to provide safety for the operator or equipment, or both.

One of the simplest of safety controls is used in alternating current arc welding to reduce the voltage at the electrode holder to a low value

during no-load periods. This is accomplished by means of relays and contactors which automatically open the circuit from the welding transformer and reconnect it to an auxiliary transformer of lower voltage; or shift the welding load to a tap of lower voltage on the main transformer winding.

Another basic control is used on induction motor-driven direct-current generators to compensate for high no-load input and low no-load power factor. At a pre-set time after welding stops, the control automatically disconnects the power supply shutting down the motor-generator set. The time interval can be set to give the welder sufficient time to replace the electrode without unnecessarily stopping and starting the set.

Many gasoline and diesel-driven generators have devices which automatically slow down the engine to idling speed during no-load periods. These devices save fuel, the savings being roughly proportional to the decreased engine speed.

REMOTE CURRENT CONTROL

Motor drives change settings of generators and transformers.

Arc welding often calls for use of different current values for different welding positions, materials or thicknesses. In such cases where the transformer or generator is distant to the welding area, a remote current control can save considerable time in changing current values. By merely pressing a button at the welding station,

a motor will change the rheostat setting of a generator, or the relative position of the primary and secondary coils in a transformer.

Some transformers automatically deliver a high initial current momentarily to make arc starting easier, especially when welding current is set at a low value.

WELD PROTECTION

Timers and solenoids control gas flow before and after welding.

Inert-gas tungsten-arc welding presents other control problems because of the additional services required. Inert gas, either helium or argon, is used in this process to protect the molten weld puddle and the tungsten electrode from atmospheric contamination. Since the gas accounts for a substantial part of the welding cost, gas conservation is important.

Many inert-gas welding operations require frequent starting and stopping. To avoid contamination, gas should flow for a short interval before welding starts to purge gas passages of air and to provide complete protection until the puddle has solidified, and to prevent oxidation of the electrode until it is sufficiently cool.

In automatic installations, gas flow is turned on and off by a solenoid valve in the gas supply line. The valve is connected to the arc voltage control so that gas will flow while welding is in progress. When welding stops, gas flows for a predetermined time and then is cut off by the solenoid valve. It remains off until the start of the next welding cycle.

OVERHEAT PROTECTION

Pressure switch or fuse assembly cuts power off if water fails.

Heavy-duty torches for inert-gas tungsten-arc welding are water cooled so that their construction can be lightweight for easy handling without becoming overheated from use of high current values. In the event of water-supply failure, a pressure switch connected into the welding control circuit will automatically cut off welding current to the torch.

Another device used to avert water-supply failure is a fuse assembly connected in the power supply line of the torch. If water flow to the torch is restricted or cut off, the power cable becomes heated and sets up a resistance which causes the fuse to blow. This cuts off welding current to the torch before any damage occurs to the equipment.

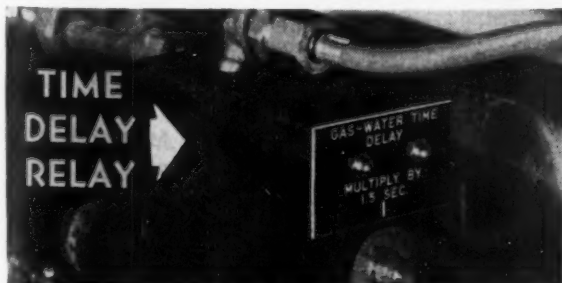


Photo courtesy of Air Reduction Co.

TIME-DELAY CONTROLS for gas and water aid in avoiding contamination after welding stops. Time range can be regulated.

VOLTAGE UNIFORMITY

Unit moves welding head to keep voltage within close limits.

Uniformity of the bead width in mechanized inert-gas tungsten-arc welding depends upon the stability of the arc voltage. Since the tungsten electrode is in a fixed position relative to the welding head, arc length is adjusted by a motor-driven head which, through a voltage control, automatically responds to fluctuations in arc voltage.

Operation of this type control is based on a reference voltage power supply which can be adjusted to the desired arc voltage. When the arc voltage exceeds the reference voltage setting, the voltage control or error voltage amplifier triggers

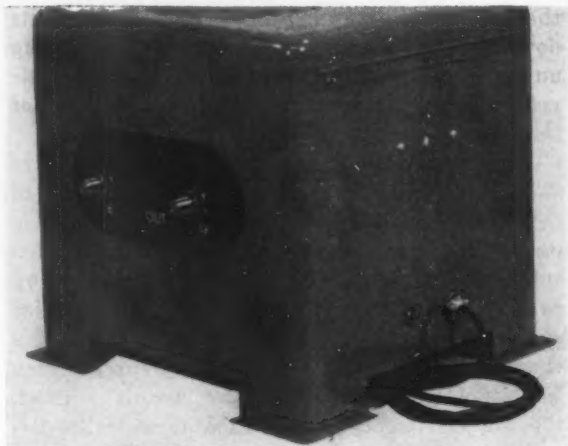


Photo courtesy of Linde Air Products Co.

HIGH-FREQUENCY UNIT connected into welding circuit starts a path for welding current to follow. Once the arc is established, the high-frequency current is cut off.

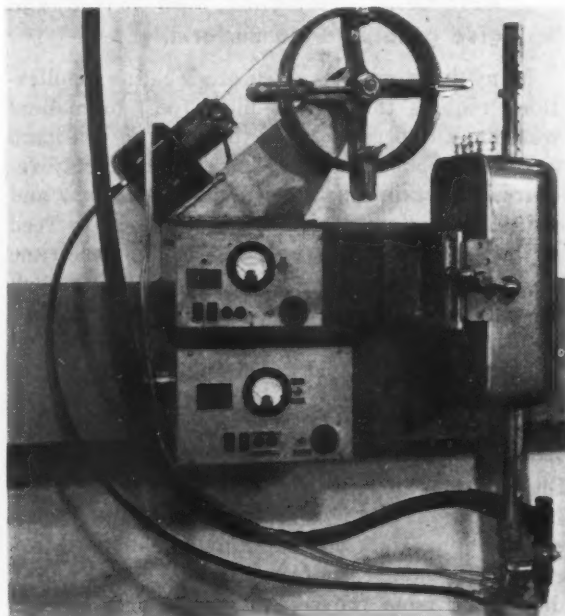


Photo courtesy of Linde Air Products Co.

AUTOMATIC WELDING HEAD responds to fluctuations in arc voltage through a control unit. A motor raises and lowers head.

the head downward, bringing the electrode closer to the work until the arc voltage equals the reference voltage. When the arc voltage decreases below the reference voltage setting, the unit functions conversely.

ARC STARTING

Retract and high-frequency units provide fast, automatic starts.

Voltage control units of this type incorporate circuits for automatic arc starting. This is accomplished by either of two means—retract starting or high-frequency starting. In retract starting, the head lowers when the switch is closed to start the weld cycle. It continues to lower until the electrode contacts the work and starts the flow of welding current. The head stops its downward movement, and retracts, establishing an arc. Once the arc is established, the automatic voltage control takes over for the remainder of the weld cycle.

High-frequency starting makes it possible to start an arc without touching the electrode to the work. With this setup, welding current is passed through a radio-frequency oscillator which superimposes very high voltage on the welding current. This voltage is high enough to ionize a path through the gap between the end of the electrode and the work. The welding current then follows this path. When the arc is started, the high-frequency circuit is automatically disconnected from the welding circuit. The energy in such a discharge is low and considered harmless.

ROD FEEDING

Automatic assemblies feed faster and give greater weld uniformity.

Many inert-gas tungsten-arc welding applications require the use of filler rod. In manual welding, an operator holds the torch in one hand and feeds rod with the other. This not only requires a certain amount of skill, but is slow and tedious. Equipment has been designed to feed rod at high rates of speed, and at the same time produce welds of greater uniformity. With such equipment, the torch is still guided manually but welding is much faster. In operation, the rod contacts the joint and pushes the torch so that the speed of welding is about the same as the rate of rod feed.

Essential equipment for mechanized wire feeding consists of a torch basically similar to a hand torch, a rod feed motor, a reel for coils of rod, an electrical control unit, plus the interconnecting cables and hoses. The rod feed motor draws rod from the reel and pushes it through a flexible cable to the torch. Motor speed can be set to feed rod from 10 to 100 ipm. The rate of rod speed is held constant at the selected value by a governor-controlled drive motor which automatically compensates for variations in the motor

load or temperature during the welding operation.

In operation, an arc is struck on the workpiece the same as in manual welding. When the arc is established, the operator merely presses a trigger at the torch handle to set the equipment into operation.

This equipment retains the flexibility afforded by manual welding but adds automatic control of arc length and speed of travel. It virtually mechanizes those operations where contoured joints are involved. A similar rod feeder is used for many mechanized applications but welding speed is determined by the speed of a motorized carriage rather than by the rod feed rate.

ARC VOLTAGE CONTROLS FEED

Wire feeds faster or slower to equal rate of consumption.

Use of a consumable electrode instead of a tungsten electrode in inert-gas metal-arc welding presents new problems of control. Because the electrode is the filler metal, it must be fed at the same rate at which it is consumed. Filler metal consists of a continuous coil of bare wire, its rate of feed being controlled by the arc voltage.

Arc voltage is maintained constantly and automatically by an electronic control which in turn regulates the speed of a direct-current rod feed motor. When the arc length decreases, arc voltage also decreases thus reducing the speed of the motor. When the arc length increases, the control operates conversely. The controls are extremely sensitive and can maintain the arc voltage, and consequently the rod feed, within very narrow limits.

Controls of this type are used for manual welding as well as mechanized welding. They usually include devices for complete automatic operation. For example, with a manually-guided torch, the operator merely presses the torch trigger to close the main welding contactor, and to start the flow of inert gas and cooling water. The arc is started by touching the welding rod to the workpiece, after which the automatic control takes over. Welding is stopped by pressing and releasing the torch trigger, or by withdrawing the torch from the work and breaking the arc.

AIR-DRIVEN HEAD

Voltage control actuates solenoid air valve which drives feed motor.

Some submerged arc welding is done manually but the majority of installations are either fully automatic or semiautomatic. Devices for controlling the rod feed rate are similar in most cases to those used for inert-gas metal-arc welding. However, one automatic welding head is equipped with an air-driven rod feed motor with the flow of air being controlled by a solenoid valve actuated

by the welding voltage. Functionally, this equipment produces results equivalent to those obtained with electrical or electronic controls.

Resistance welding equipment can be simple or complex, depending on the work and the degree of control desired. Standard resistance welding machines include controls for current, pressure and time. More specialized machines may be supplemented by controls for feeding and handling the work, sequencing, preheating, postheating and normalizing. Many of these controls are designed for specific applications.

MULTICHANNEL OSCILLOGRAPH

Records many variables and helps to determine proper settings.

Some welding applications are very critical and must be carried out with minute detail. This is particularly true in the production of modern aircraft and high-speed missiles where aerodynamic heating raises the temperature at the boundary layer from 600° to 1600° F. Aluminum alloys lose much of their strength at these temperatures and steels are seriously affected.

In flash welding of aviation parts, a multi-channel recording oscillograph can record many variables simultaneously. The important feature of such an instrument is that it can record phenomena from static conditions up to 3000 cycles per second. The variables involved are recorded and plotted against time. Several test runs at different machine settings then provide a positive method of determining the proper adjustments for satisfactory welds.

AUTOMATIC INSPECTION

Scanning unit detects and marks defective weld areas.

Another device which assures satisfactory welds is a photoelectric scanning unit for automatic inspection of large-diameter resistance-welded line pipe. This unit scans the pipe as it is welded, detects defects electronically and marks the defective area. It eliminates the need for constant visual attention on the part of the operator and affords more thorough inspection.

Pipe must be brought to a Magnaflux inspection unit with the weld up. After the weld is made, a mixture of calcium carbonate and water is sprayed on the pipe to provide a white background stripe about 4 to 6 in. wide. With the pipe at elevated temperature, the stripe dries in about 3 sec. At this inspection unit, Magnaflux powder is applied and blown off, leaving indications of any cracks.

As the pipe passes under the scanner, white light is reflected from the coated surface and focused into a slit in front of a phototube. Where no defects exist, the unit sees a white background

and has a uniform voltage output. If a defect occurs, the black indication momentarily decreases the light picked up by the unit and a voltage pulse is produced. This actuates a relay which in turn operates a solenoid valve, causing a spray to mark the defective area with a convenient color.

Manufacturers

The following are among manufacturers of the type of automatic control equipment described in this section.

Air Reduction Co.
Linde Air Products Co.
General Electric Co.
Lincoln Electric Co.
Consolidated Engineering Corp.
Magnaflux Corp.
Reid-Avery Co.
Sight Feed Generator Co.
Mid-States Welder Mfg. Co.



Photo courtesy of Linde Air Products Co.

ROD FEEDING is controlled automatically in tungsten-arc welding thus relieving the operator from feeding rod by hand.

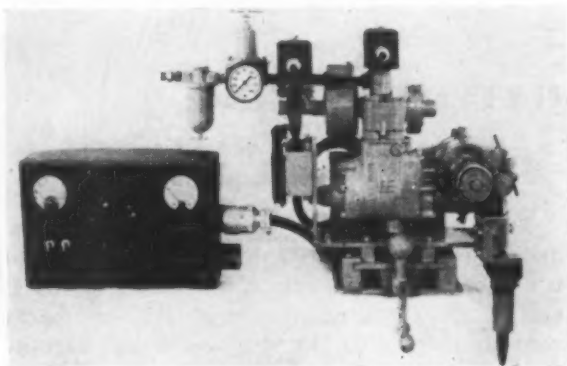
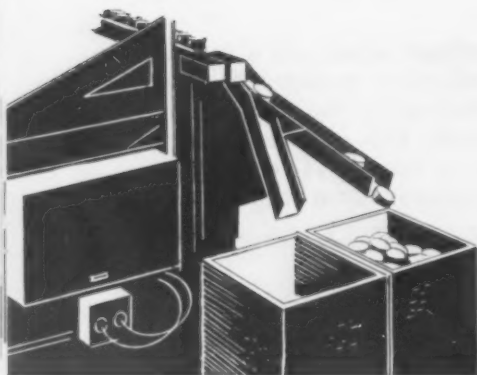


Photo courtesy of Linde Air Products Co.

COMPRESSED AIR drives the rod feed motor of this welding head. A control unit actuates a solenoid valve which regulates airflow.



COUNTING & WEIGHING

AUTOMATIC PROCESS CONTROL

- Preset counters prevent overruns.
- Electronic weighing for heavy-duty jobs.
- Batch counters for carton quantities.
- Photoelectric cell controls tack weighing.

PRESET COUNTERS:

Costly overruns eliminated with production regulating counters.

Automatic counting devices used on many types of equipment regulate machine output to produce only a required number of parts. These units provide one means of production control by eliminating costly overruns and underruns. Automatic devices not only can count the number of pieces in a batch but also record the number of batches produced. Some units automatically count and control different successive operations.

Preset counters made by various manufacturers are designed with two sets of figure wheels. The number of units required for a production run is set by hand on the preset wheel, see Fig. 1. When operating, the counting wheel adds and the preset wheel subtracts. When the required number is registered on the counting wheel, contactors within the counter make or break an electrical circuit.

Contactors are connected to give a signal or operate a relay to stop or start machinery after

a required number of units have been produced. They can be installed so that the signal will continue until the preset counter is reset for the next run. This prevents operators from starting a machine before it is set for the next cycle.

Fig. 2 shows a preset counter installed on a Niagra press. It is wired into the relay cabinet controlling the drive motor so that the press will be shut off when the required number of parts are produced. Another make of counter is shown in Fig. 3 installed on a V&O press. The cycle-control unit actuates a cutting tool after a predetermined number of press strokes and so supplies a desired length of strip. Other applications of preset counters are shown in the box, below. Some predetermining counters contain two sets of counters, one for controlling predetermined quantities, the other a totalizing unit for adding job lots of quantities produced during certain time periods.

BATCH COUNTING:

Unit counts carton quantities without interrupting production.

Automatic batch counting devices have been applied to a battery of automatic seal manufacturing machines, see Fig. 4. In this setup, exact carton quantities are produced without interrupting production, cartons are handled automatically and the number of seals produced by each machine are recorded.

From a machine, seals slide down a chute, actuating a switch which registers each one on a counter on the machine, and drop into the car-

PRESET COUNTER APPLICATIONS

Punch Presses	Coil Winders
Hydraulic Presses	Pebble Mills
Wire Cutting Machines	Textile Machinery
Printing Presses	Steel Mill Machinery
Metal Sawing Machinery	Wire Measuring Machines
Threading Machines	Wire Reeling Equipment
Turret Lathes	Paper Mill Machinery
Automatic Screw Machines	Box Making Machinery

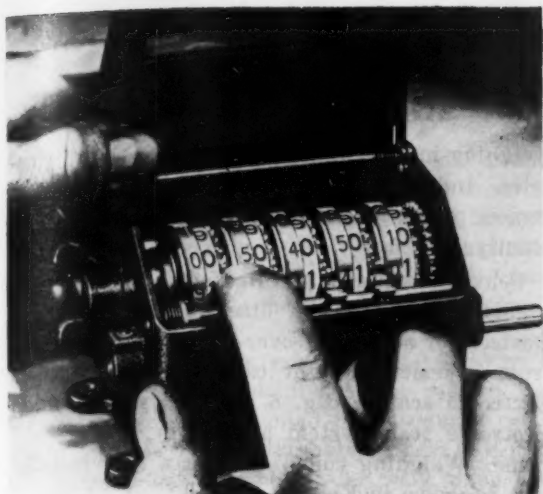


Photo Courtesy Yeeder-Root, Inc.

FIG. 1—Units to be produced during production run are hand set on counter.

ton. When a required number of seals fills a carton, the counter closes the chute gate and starts the counter-changing conveyor, see Fig. 5. At the same time, the counter readjusts and starts counting for the next lot. The filled carton moves onto another conveyor and an empty one takes its place. When the empty carton is in position under the chute, the conveyor stops, the chute gate opens and the cycle is repeated.

Batch counting units can count anything which is arranged to operate an electric switch, relay, photoelectric unit or other circuit-breaking device. Quantities are set by turning a dial pointer to required numbers.

A number of electrically operated batch counters equipped with interrelated controls can be used for count-controlling a series of operations which occur successively. Each control unit regulates a particular function, counts the operations and at completion of the batch count, shifts control to the succeeding control unit.

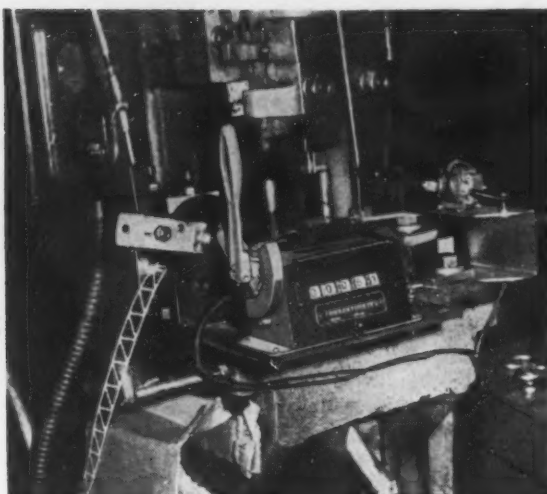


Photo Courtesy Durant Mfg. Co.

FIG. 2—Preset counter is wired into press drive motor thus controlling output.

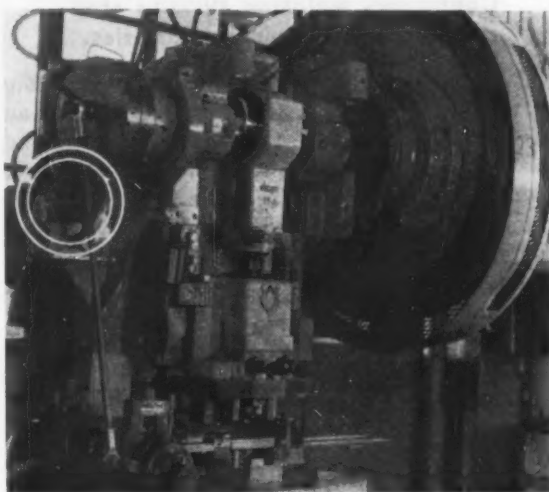


Photo Courtesy Counter and Control Corp.

FIG. 3—Counter on press controls cutting tool to produce desired strip length.



Photo Courtesy Production Instrument Co.

FIG. 4—These seal making machines are equipped with automatic batch counters.

ELECTRONIC WEIGHING:

Accurate, automatic measurement for heavy duty applications.

Electronic weighing systems provide an accurate, automatic method for measuring raw materials and finished products in cranes, conveyors, tanks and other heavy duty applications. These systems consist basically of a strain-gage type load cell together with recording instruments which indicate the load applied to the load cell. Loads ranging from 100 to 200,000 lb can be handled by these units.

The electronic scale system can be located at convenient weighing points where the use of a lever system is impractical. This makes them particularly suitable for crane, conveyor and car

weighing in steel, mining and other heavy industries. Indicators on recorders can be placed at remote points where weights can be observed instantly.

Continuous timers permit loads to be measured regularly without the attention of operators. Devices for signalling over and under variations from a desired weight can also be applied to electronic scales. Fig. 6 shows a sketch of an electronic scale system applied to an overhead crane. Weighing coiled steel in a mill installation is shown in Fig. 7.

BELT CONVEYORS:

Continuous weighing systems stop conveyors at required quantities.

Automatic measuring systems for handing moving materials on a belt conveyor provide an instantaneous record of the weight of the moving material and a reading of the accumulated tonnage. Tare scales can be used if necessary to compensate for loading on the belt. To determine the quantity delivered during a given period, the weight on a short section of belt and the belt speed are multiplied.

A weighing system of this type consists of a strain gage, tachometer, generator and recording instrument, see Fig. 8. The generator produces a voltage proportional to the belt speed. This voltage is applied to the strain gage which measures the weight of material on a given section of belt. The strain gage transmits a voltage, proportional to the weight and belt speed, to the electronic recording instrument. The recording instrument

records the instantaneous flow on a circular scale and keeps a continuous record of flow on a circular chart. Total tonnage delivered is accumulated on a counter.

Continuous weighing systems can be equipped with preset counters which stop the conveyor belt when a predetermined quantity is delivered. With this system, it is possible to control feeding or conveying mechanisms to maintain the rate of flow at some desired level. This permits control of mixing and blending operations to very close limits. The recording instrument can be placed as far as 5000 ft from the belt conveyor to provide remote control.

This type of system is not particularly suitable for weighing small quantities or unit packages. The material must be moving continuously and be uniformly loaded on the belt. Applications where it has proven successful include: Measuring of coal in power plants, ore recovery in smelting plants, chips in paper mills, and in cement, fertilizing and chemical plants.

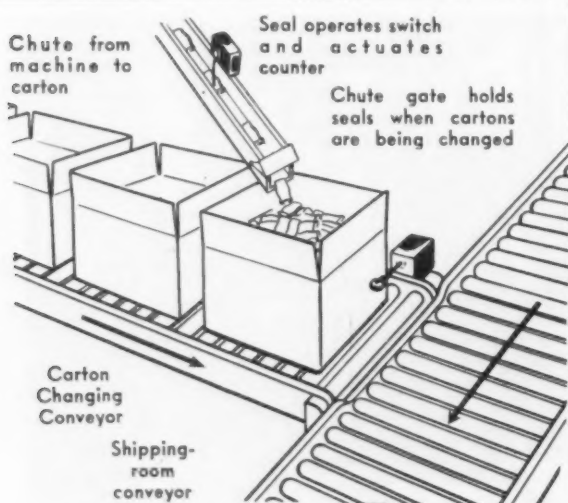


FIG. 5—Diagram shows details of the automatic batch counting system.

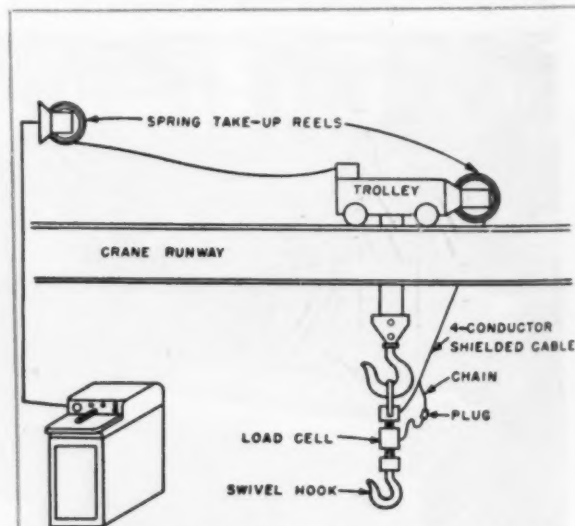


FIG. 6—Diagram of electronic scale system installed for overhead travelling crane.

PHOTOELECTRIC CONTROL:

Unit reduces overage due to overweighing, increases output.

To automatically package carpet tacks, one manufacturer is using a photoelectric control. Formerly tacks were vibrated by a feeder through a chute into a box on a small scale. When the scale weight was reached, the filled box was lifted off the scale by means of a switch closed by an operator.

Increased production rates were achieved by a photoelectric control mounted at the rear of the scale, see Fig. 9. The small light beam is positioned so that it is interrupted by a balanced cantilever arm attached to the scale when the proper box weight is attained.

The electric feeder stops the flow of tacks when de-energized by the photoelectric control. The indexing mechanism then replaces the filled box with an empty one. Added to increased production and reduced labor costs were appreciable savings gained by preventing overages.

PREVENTING OVERLOADS:

Device transmits signal when hoist or crane is overloaded.

One of the major problems in operating cranes and hoists is the danger of accidents due to overloading. One type of overload signal is automatic in operation and actuates warning devices such as lights or alarms. Where it is desirable to cut into the motor circuit, lead wires from the signal can be hooked into the electrical system so that on overloads the power is automatically turned off preventing a pickup.

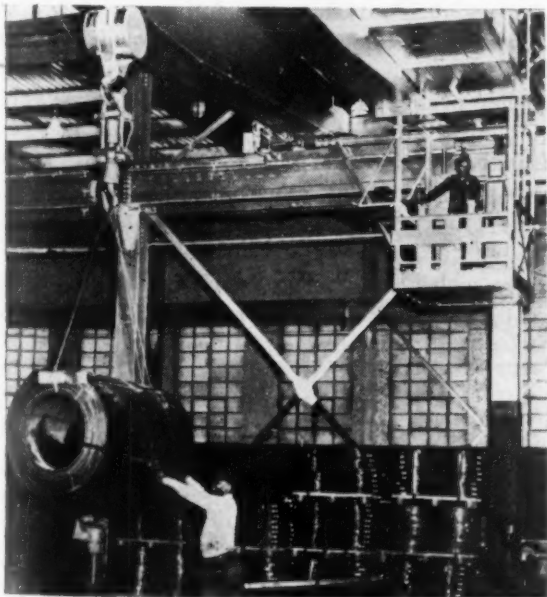
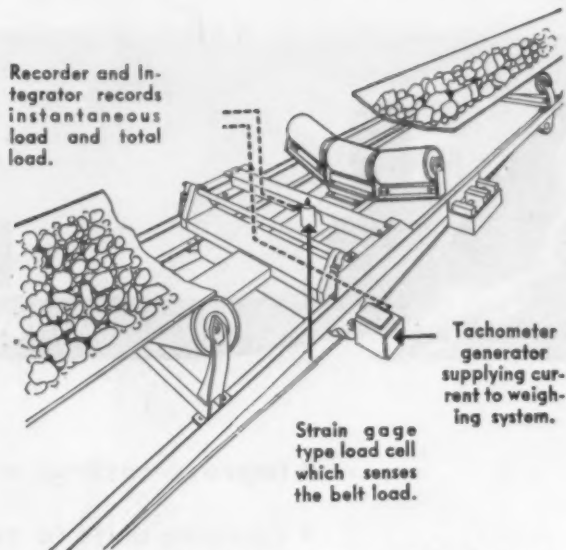


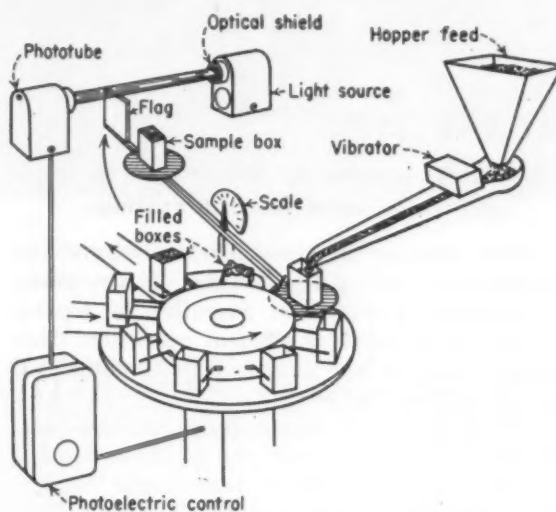
Photo Courtesy Streeter-Amet Co.

FIG. 7—Electronic scale is used here to accurately weigh steel coils on crane.



Drawing Courtesy Minneapolis-Honeywell Regulator Co.

FIG. 8—View of conveyor belt with load cell, tachometer and recorder in position.



Drawing Courtesy Photoswitch Co., Inc.

FIG. 9—Photoelectric cell prevents losses due to overage in packaging tacks.

Manufacturers

The following are among manufacturers of the type of automatic control equipment described in this section.

COUNTING:

Bristol Co.
Counter & Control Corp.
Durant Mfg. Co.
Eagle Signal Corp.
Guardian Electric Mfg. Co.
Potter Instrument Co.
Production Instrument Co.
Streeter-Amet Co.
Veeder-Root, Inc.

WEIGHING:

W. C. Dillon & Co.
Baldwin-Lima-Hamilton Corp.
Fairbanks, Morse & Co.
Gilmore Industries, Inc.
Minneapolis-Honeywell Regulator Co., Industrial Div.
Photoswitch, Inc.
Ruge-de Forest, Inc.
Streeter-Amet Co.
Toledo Scale Co.
Trans-Weigh Co.



FOUNDRY

AUTOMATIC PROCESS CONTROL

- Improve castings with air weight control.
- Combine units to get better mixing of foundry sand.
- Heat controls solve maintenance problem.

BLAST AIR:

Weight control for higher iron to coke ratio, more uniform castings.

Since changes in atmospheric pressure and temperature affect the weight of air, many foundrymen consider it essential to control cupola air weight for efficient operation. This means a higher iron to coke ratio, greater consistency in casting quality.

One system for maintaining constant air-weight control measures the power consumed by the motor driving a centrifugal blower. Measurement of this power develops a high level hydraulic signal in proportion to the deviation from a preset power level. This hydraulic force acts on a double acting hydraulic cylinder to position the blast gate.

In this unit, a wattmeter which resembles a torque motor produces a torque proportional to the measured power by comparing current going to the blower motor to the actual blower motor voltage. The hydraulic mechanism connects this "torque motor" to the blast gate so that an increase in motor power acts to close the gate; a decrease to open it.

SAND WEIGHING:

Electric load cells control hopper feeding to assure predetermined mix.

Automatic weighing and proportioning of foundry sand is an interesting result of combining electric load cells with recorders and controllers. How it's done is shown in the accompanying sketch. By referring to recorded charts, operators can see exactly how much sand

Co-ordinated instrumentation which automatically controls both the weight and the temperature of blast air has been introduced by another manufacturer. An operator sets the control point of an air weight controller. The instrument then measures the flow of air in the blast line, corrects it according to barometric pressure and temperature and operates a control valve to maintain the present air flow. Having established the correct oxygen flow, the next step is temperature, which is adjusted by throttling a valve in the preheater system. Other preheater temperatures are logged continuously and the water valve to the heat exchanger spray system is automatically regulated to cool the combustion gases before they enter the precipitators. One of these units is shown in an accompanying photo. More uniform melting temperature throughout the heat and greater fuel economy are among the advantages cited for this complete control.

was proportioned for previous molds on the same or similar jobs. They simply set control dials and the apparatus weighs out the amount of each type of sand needed for that type of mold. The operation is continuous from the time the empty bucket is in place until it is filled.

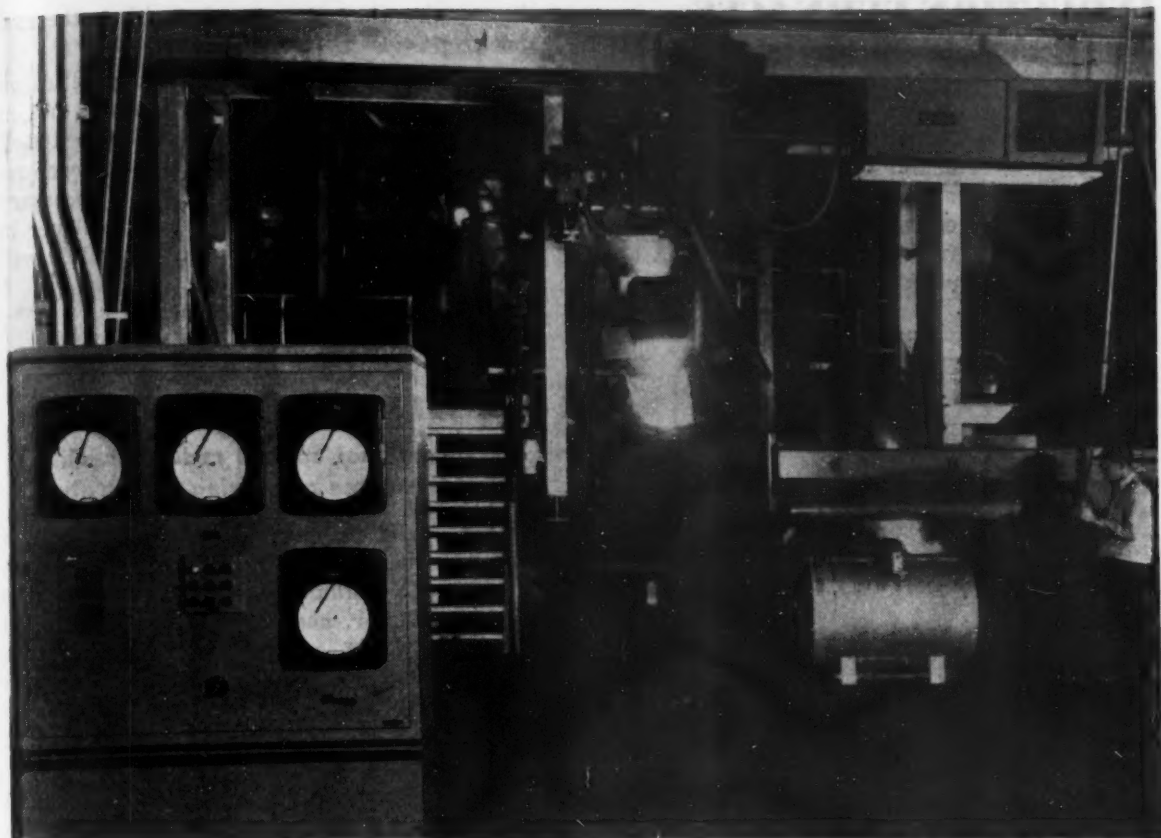
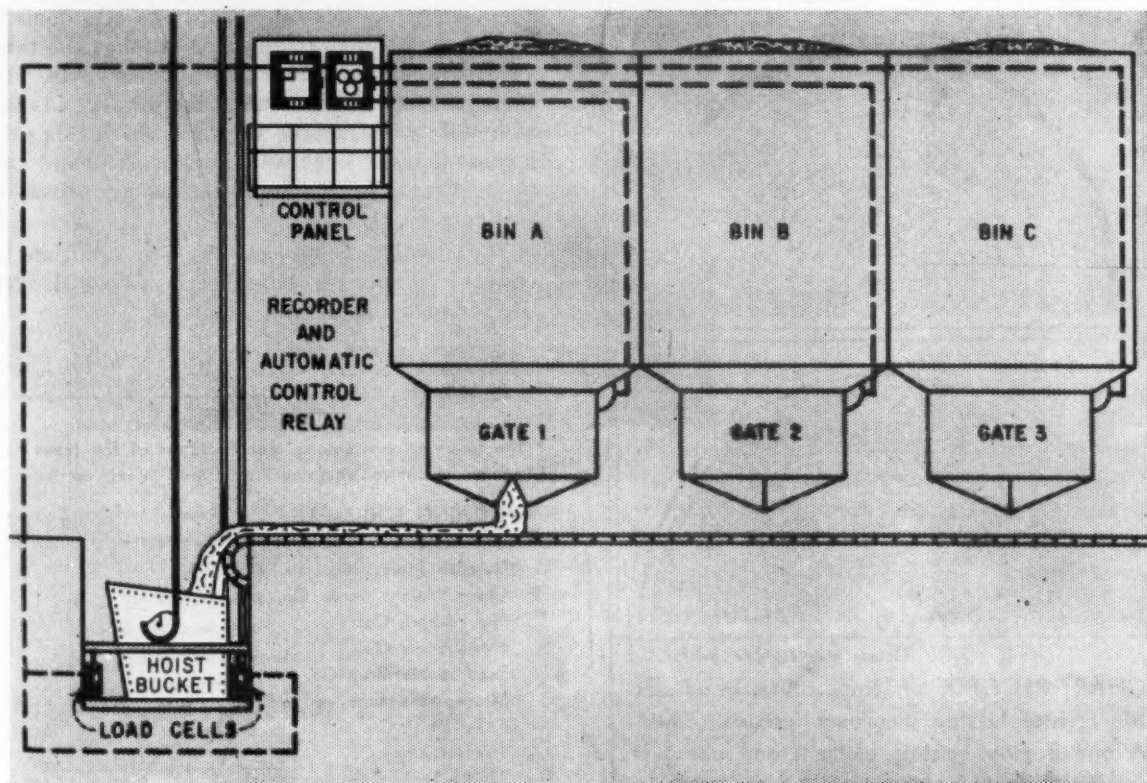


Photo courtesy The Foxboro Co.

BLAST AIR WEIGHT and temperature are both controlled automatically in this modern auto-

motive foundry by instruments in the cabinet shown at the left foreground.



Sketch courtesy Leeds & Northrup

MOLDING SAND is automatically weighed by load cells supporting bucket. Automatic cycle

starts with opening of gate No. 1. The result is a predetermined sand mix.

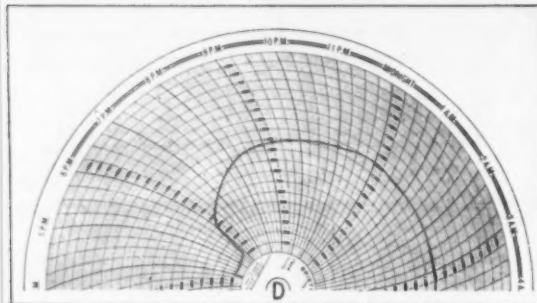
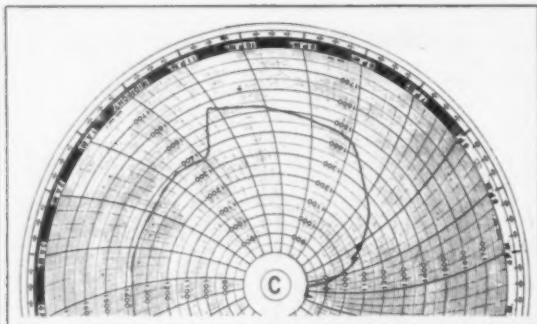
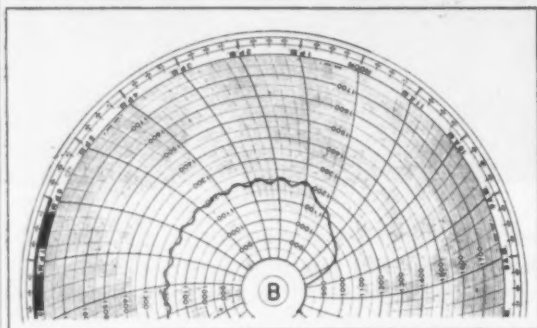
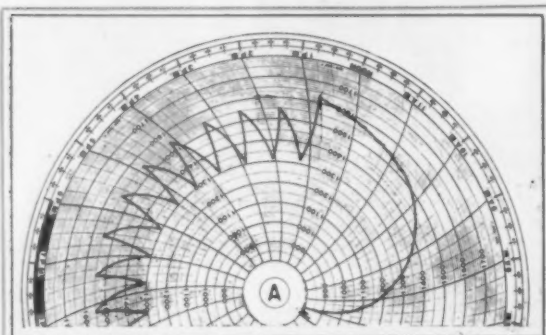
INDUCTION FURNACES:

Temperature controllers pay off when induction units are held over.

Many of the larger foundries which use big submerged resistor induction furnaces find that it pays to use automatic instrumentation to keep the furnaces hot during slack periods. These furnaces are started by preheating the linings and then pouring in molten metal. Their

shape makes their linings vulnerable to thermal shock.

So it is usually considered good practice on shutdowns of up to 3 or 4 days to keep a molten heel of metal in the furnace at 50 to 100 F above its solidification temperature. Power requirements are relatively low. If it is necessary to have an electrician and perhaps a helper in for three shifts, an automatic controller will pay for itself in a few months.



Charts courtesy The Bristol Co.

CHART RECORDS of temperatures in an electric resistor heated aluminum furnace. Charts A and B show heating element and aluminum temperatures respectively with the furnace on on-off control. C and D show how cycling is reduced by proportional input control.

ALUMINUM CASTING:

Proportional control reduces cycling, holds furnace at pouring temperature.

High quality aluminum castings depend in part on close temperature control in pouring. But where aluminum holding furnaces of the electric resistor heated type are controlled simply by on-off controls, close temperature control is not usually achieved. The melter can wait until his furnace is at temperature, or he can use a control that will hold the temperature he wants.

Heat control of the molten aluminum and that of the resistance elements and furnace insulation create the problem. One solution is use of time-average-position type control or "proportional current input control." With this type of instrumentation the flow of current to the heating resistors is periodically interrupted. The length of these interruptions is automatically proportioned to the amount that the temperature deviates from the desired value. The instruments have a "control band" which is the range of temperatures through which this proportional input occurs. Width of the band can be adjusted for different makes and sizes of furnaces.

The result of less cycling—in addition to improving pouring characteristics—is longer life for pots and heating elements.

Manufacturers

The following are among manufacturers of the types of automatic control equipment described in this section:

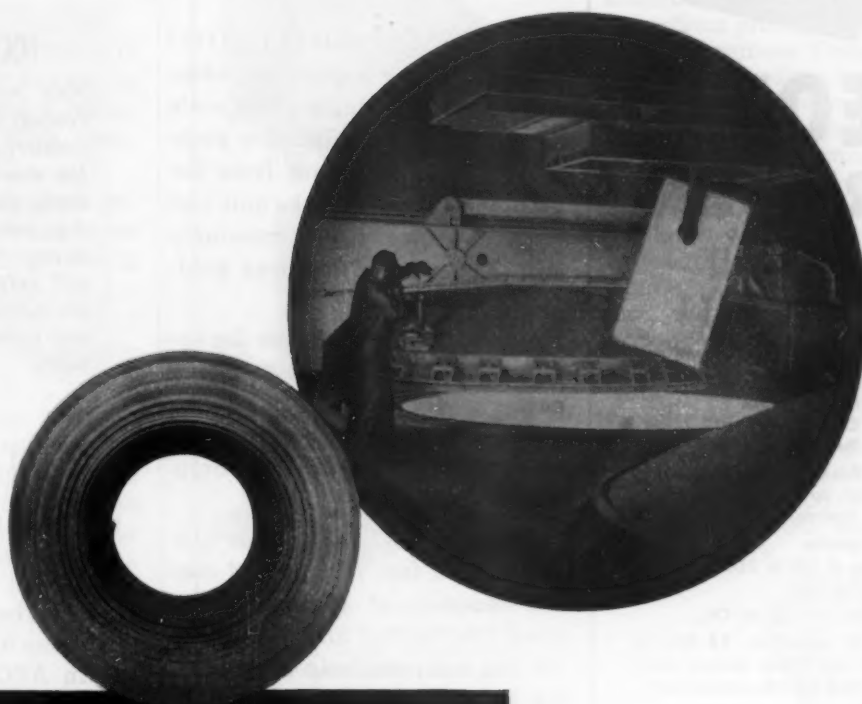
WEIGHING EQUIPMENT:

The Bristol Co.
Deteco Scales, Inc.
Exact Weight Scale Co.
The Foxboro Co.
Howe Scale Co.
Leeds & Northrup Co.
Minneapolis-Honeywell Ind. Div.
Roller-Smith Co.
Streeter-Amet Co.
Toledo Scale Co.

For temperature and combustion controls see listings in "Heat Treating" and "Melting and Rolling" sections.

Newport Steel

**SPENT A FORTUNE
to MAKE THIS INGOT INTO COIL**



Six minutes after leaving its soaking pit at 2300° F., an ingot becomes a five-ton coil of hot-rolled steel. In that short time it passes through all the units that comprise Newport's new reversing hot mill: 2-Hi slabbing mill and edging mill; roller hearth furnace; 4-Hi stand and coiler furnaces; and finally, the runout tables and finish coiler. This modern, highly efficient facility is representative of the additions this 68-year-old firm is making to improve and expedite the many grades of steel which hundreds of users prefer to buy from Newport. Let us talk with you about your requirements.

PRODUCTS OF NEWPORT STEEL

Hot-Rolled Steel in Coil
Hot-Rolled Pickled Steel in Coil
Electric Weld Line Pipe
Hot-Rolled Sheets
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Galvannealed Sheets
Colorbond Sheets
Hot-Rolled Pickled Sheets

Electrical Sheets
Alloy Sheets
Roofing and Siding
Eave Trough and Conductor Pipe
Culverts



ECONOMICAL WATERAIL DELIVERY

Newport Steel is situated on the Mississippi-Ohio River system and the great Cincinnati rail hub. With the advantage of location, new river barge facilities and seven major railroads, Newport gives economical, dependable delivery to industrial areas throughout the Middle West and South.

Newport Steel

CORPORATION

NEWPORT, KENTUCKY



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Reactions complete! Less than one part per million impurity remaining . . .

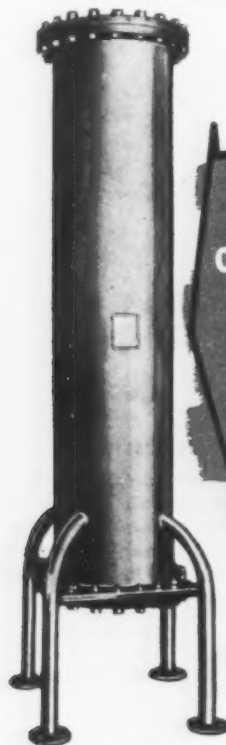
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No Operating Cost
No Reactivation**

Operate at Room Temperature:
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At 250° Centigrade:
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Automatic Control

APC: Bright Light In Industry Future

New and improved measuring and control systems solve basic industry problems . . . Get more production, lower unit cost, improve quality—By W. B. Olson.

Automatic Process Control (APC) is being applied by industry on an increasingly wider scale to solve three basic industry problems: Get more output from the productive setup; cut the unit cost of manufacture; meet increasingly stiff demands for improved product quality.

There are other reasons for applying APC. Often the over-riding necessity for greater safety for both operator and equipment makes installation of APC units mandatory.

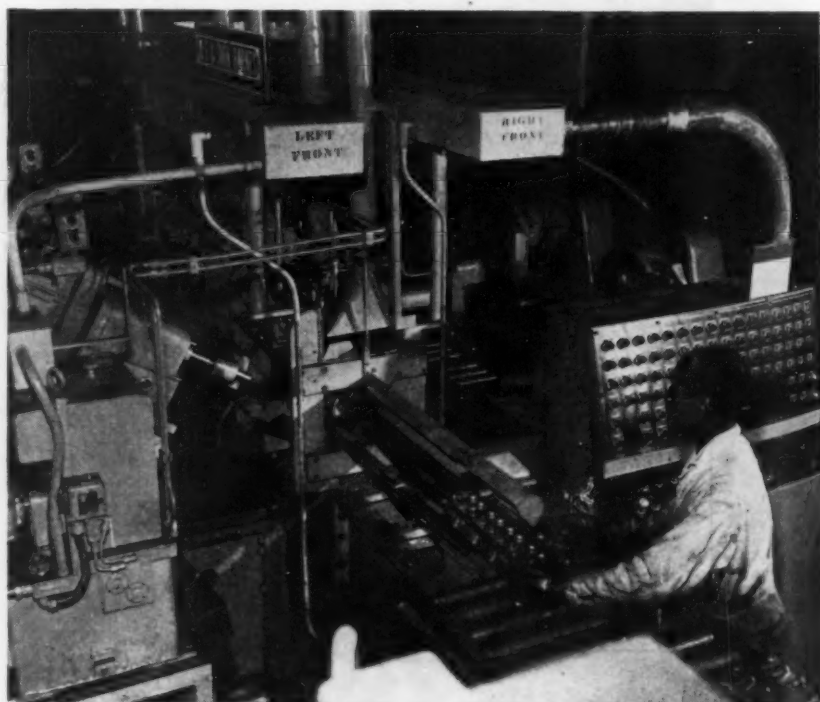
What is APC? Basically it substitutes the fast sensing and control reactions of a group of devices (mechanical and electronic) for the comparatively slow sensing and control reactions of an operator.

FOCUS ON CONTROLS

New importance of Automatic Process Control in solving basic industry problems is reflected in the many examples of APC at work, pages 273 to 304. Iron Age editors have canvassed industry for applications which will help stimulate thinking on the almost unlimited opportunities extended use of APC presents.

Typical application would be a heat treating operation in which temperature is held within prescribed limits. One section of the APC unit measures temperature, and another sends out the correcting pulse which controls fuel flow.

An APC unit immediately recognizes deviation of a machine from a prescribed path. The con-



TRANSFER MACHINE drills and taps holes in cylinder head for Ford tractor engine. Controls help operators cope with increasingly complex manufacturing methods.

trolling unit puts the machine back on the right track. It's done in far less time than would be possible with an operator. That means better quality, less scrap, less hazard to the machine, and higher production.

Why APC Now?

Automatic Process Control is used in greater or less degree in practically every metalworking plant in the country. What, then, makes it more important now?

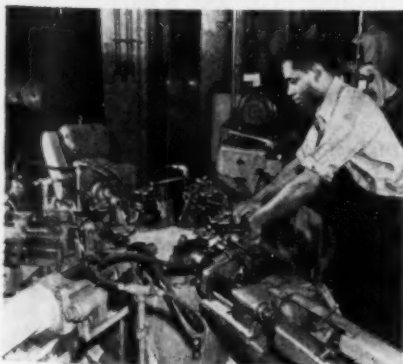
Answer is the wedding of improved controlling units and more sensitive measuring devices. World War II gave new emphasis to development of devices which could act as control units — automatic pilots for instance.

Availability of many new devices, plus a new engineering awareness of what could be accomplished with control units, came when industry needed new devices to meet the basic problems. Since World War II a new concept of manufacturing control has been growing steadily.

Reins on Speed, Power

Two things make APC different from controls which were basically mechanical. What APC does is to substitute mechanical, electronic, pneumatic and hydraulic devices for human thinking. It's not just a matter of replacing an operator by a control device.

On today's high speed machines, an operator often cannot react rapidly enough to make the necessary changes which would offset machine deviation. In the split



DRILLING AND TAPPING oil transfer holes in hydraulic lift cylinder.

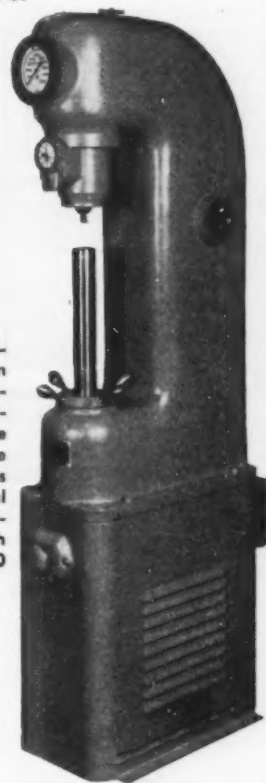
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YOU CAN ALWAYS DEPEND ON *Steel City* TO FURNISH THE *Right* BRINELL HARDNESS TESTER FOR *Your* NEEDS



Dead weight type, manually operated, bench mounted Brinell Hardness Tester. Weights are linked mechanically to ball penetrator. Dash pot below weights makes load application gradual and smooth. Instantaneously select any load 500 kg. to 3000 kg. Exceptionally accurate; low maintenance. Also available as floor model and motorized.

Individual requirements differ. Laboratory needs are far different from production needs. The Brinell Hardness Tester you buy must be exactly suited to your application. Our complete line of Brinell Testers includes the correct type for practically every need. Our reputation in this field since 1914 proves that if we do not have what you require, we can easily convert one of our standard models to fit your specifications. On this page are illustrations of two typical Steel City Brinell Testers. Other types available include portable, bridge type, deep-throated and long stroke designs and models to fit into your conveyor line. Write to us for a descriptive catalogue or address of our nearest sales representative.



Direct reading type, hydraulically operated, motor driven Brinell Hardness Testing Machine for production line testing. "Direct reading" feature eliminates time-consuming use of Brinell microscope, sometimes avoids spot-grinding. Interval timer automatically controls testing cycle. Simplified knee switch operation. Tests up to 800 pieces per hour.

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Compression,
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Special Testing
Machines,
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and Proving
Instruments

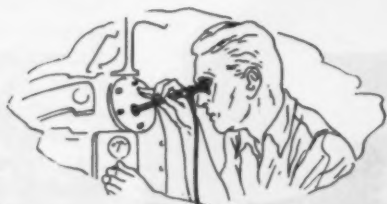
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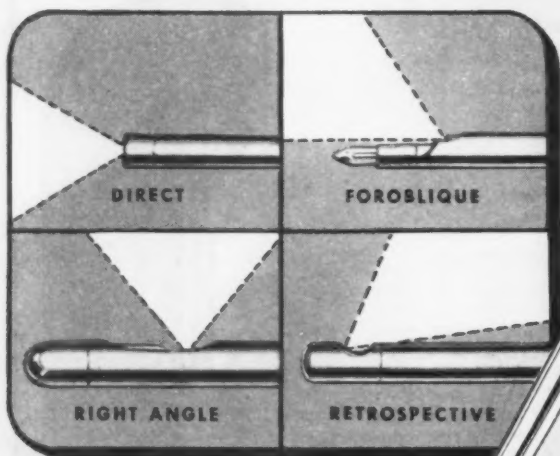
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NECESSITY OF DISMANTLING AVOIDED

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A.C.M.I. Borescopes are available in
4 angles of vision (as above)—
in diameters of .120" to 4.00"—
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Special models for
special problems.



The A.C.M.I. Borescopes permit close-up visual examination of interior areas and surfaces not otherwise visible. They save time and money, and prevent costly dismantling, by providing a practical solution to a wide variety of inspection problems.

In maintenance and inspection work, on small internal bores, machine parts or castings, to large boiler tubes, chemical plants, process equipment, or other industrial installations, an A.C.M.I. Borescope may be the answer to *your* problem.

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Invaluable for selective assembly methods of production. Parts are measured and sorted into any number of dimensional categories with great accuracy and speed. 100% inspection without interfering with production schedules. Semi-automatic or hand fed.

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WHERE

Quality Counts...



**ROLL
GRINDING
CONTROL**

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PRATT & WHITNEY GAGES

When it comes to rolling steel strip, effective Quality Control starts with accurate roll grinding. That's why The Wallingford Steel Company of Wallingford, Conn. -- specializing in meeting *exactly* the most rigid specifications for gage, finish and temper -- has adopted P&W Gaging in its Roll Grinding Department. Shown here in use are:

THE P&W ELECTROLIMIT SNAP GAGE -- for the ultimate in dependable accuracy in gaging roll diameter. The Gaging Head is conveniently brought to the roll on the grinding machine; interchangeable frames accommodate rolls from 1½" to 10" diameters. The separate Meter is accurately read at a glance; dual magnification provides direct readings to .00005" or .0001" with full scales of ±.001" or ±.002".

THE P&W ELECTROLIMIT CONTOUR GAGE -- for the ultimate in accurately gaging and recording roll contour. The Gaging Head is conveniently mounted for testing the roll on the machine and is easy to engage or disengage at any time. The separate Meter and Recording Unit provide an instantaneous visible reading *plus* a permanent record of the roll contour. This latter is a valuable aid to effective quality control and is also used in analyzing roll performance *after* use in the mill. By rotating the roll, this Gage can be used to check "run out" and can also serve to check the machine assuring that centers are on the same axis. Dual magnification provides two scales for convex or concave rolls with readings direct to .00005".

For Complete Information -- on Pratt & Whitney Gages for Roll Grinding, write on your Company letterhead to the P&W Branch Office nearest you or direct to West Hartford. Engineering Data Sheets are available and P&W Gage Engineers will be glad to study your requirements and recommend the Gages best suited to your exact needs.

And -- be sure to read the facing page; see how P&W Gaging controls the quality of the finished strip.

PRATT & WHITNEY

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Automatic Control

Continued

second required for the human machine to sense and react, the modern high speed machine has had time to ruin a part.

Several industry experts have pointed up this failure of the human machine to equate to the demands of high speed machinery. O. C. Turchan, Turchan Follower Machine Co., posed the problem this way at a recent meeting of the American Society of Tool Engineers at Detroit:

Human Reaction Time

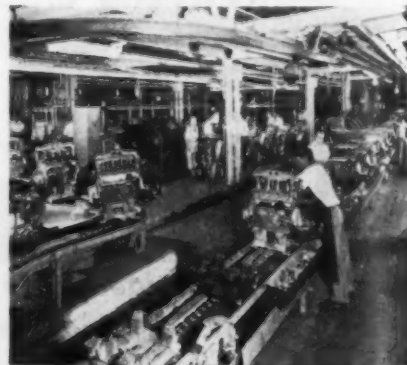
(1) It may be impossible for a human operator to carry out a control operation because of power and speed limitations, or severe ambient condition.

(2) The human reaction time, roughly 0.3 seconds, may be insufficient in systems where high speeds of response are essential.

(3) All industrial processes in the manufacture of interchangeable parts or other uniform products, require a continuous and accurate control over a long period of time. The performance of a human operator often leads to undesirable physical fatigue, causing deterioration of performance. The operator is subject to mental stress during the operation of the control and a rapid falling off of efficiency is unavoidable.

Wide Variations Result

(4) It is impossible to standardize the behavior of human operators unless relatively simple operations are involved. Thus the results end in a wide variation in the operational characteristics of



END OF FINAL motor assembly conveyor line at Ford tractor plant.



DRILLING VALVE body holes in hydraulic lift cylinder of Ford tractor engine.

such systems and usually in a non-uniform behavior.

(5) Frequently it is uneconomical to use manual controls, especially if economy in manpower is required.

Take the case of a big rolling mill. W. R. Harris of Westinghouse Electric Corp. points out that a recently installed 80-in. hot strip mill has 55,000 hp under the control of a handful of operators.

Hands Not Fast Enough

Human hands are not fast enough to twist the knobs and push the buttons which control many types of modern factory equipment, he states. Solution to this problem has been the ever expanding use of automatic regulating systems to control today's mechanical giants smoothly and with authority.

This adds up to clear gain. APC helps achieve a high rate of productivity with parts of consistently high quality, with a minimum of physical strain.

APC Piece By Piece

When you start talking about APC one thing stands out right away. Automatic Process Control can be widely applied to individual operations without getting involved in the "automatic factory."

That point is important in industry thinking. It means that each APC installation can be evaluated as a unit installation. You want to get more from a piece of machine tool equipment, or from a heat treating furnace. Figure the costs on that one operation, then

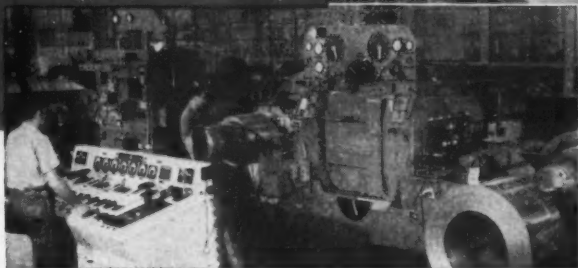
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WHERE

Quality Counts...

STRIP
ROLLING
CONTROL

with



Photos: THE WALLINGFORD STEEL CO'S. SENDZIMIR MILL INSTALLATION

PRATT & WHITNEY

Continuous Gaging

Continuous Gaging for rolling mills — originated, developed and brought to its present state of high efficiency by Pratt & Whitney — has made it possible to improve strip quality, eliminate waste and rejects, and increase average production from 150 to as high as 7,000 feet per minute. It was, therefore, a natural choice when The Wallingford Steel Company of Wallingford, Connecticut selected P&W Continuous Gages for their fine new Sendzimir Mill. The result — strip as thin as .002" is produced to tolerances as close as $\pm .0001$ ".

As shown here, two types of Pratt & Whitney Continuous Gages are used. The Model D Electrolimit Gage gages the strip from .125" down to .015" in thickness (gage range is .375" to .002"), and a P&W Beta Ray Gage — completely non-contacting — gages strip from .015" down to .002" (gage range is .030" to .0005"). Mounted on a cross slide, either gage can instantly be placed in operating position. Both gages accurately indicate thickness variations to .0001" on the easily read meter located at the operator's control station. As the Sendzimir is a reversing mill (rolling left-to-right and then right-to-left) a set of two gages is installed at each end. All four gages are connected to a Recorder that provides a permanent record of all thicknesses rolled.

If quality control is important in your rolling operations, you'll want to know more about P&W Continuous Gages. Use the coupon below to send for the completely descriptive Circular No. 553. If you have a specific gaging problem, P&W Gage Engineers will be glad to recommend equipment exactly right for your requirements.

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Send For Complete Data



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MACHINE TOOLS • CUTTING TOOLS • GAGES

A guide for selecting temperature control for top furnace performance

Today, industry's need for lower operating costs . . . reduced maintenance . . . high quality of production . . . has spot-lighted the importance of "tight" furnace control.

With closer specifications and higher control standards, more and more plants must pin down troublesome, costly departures from favorable heat-treating conditions.

To meet this demand, Leeds and Northrup has a complete line of matched temperature control systems available. You get equipment matched to your particular requirements.

Each system comes to you as a "package" ready to handle the individual conditions created by your product, your production and your furnace.

TWO-POSITION CONTROL

For fuel-fired or electric furnaces

What it does:

Cuts heat input back to "low" when temperature exceeds control point . . . turns heat input on full when it falls below control point.

When to use it:

1. When changes in heat supply or changes in load are promptly "felt" by the temperature detector.
2. When alternate undershoot and overshoot will not damage product or process equipment, or slow down production.
3. When furnace pressure or fuel-air ratio are not controlled and the products of combustion do not form a protective atmosphere for the work.

PROPORTIONING-TYPE CONTROL

For fuel-fired furnaces

What it does:

Adjusts heat input by varying valve opening according to size of temperature change.

When to use it:

1. When there's a substantial time lag, before changes in heat supply or changes in load are "felt" by the temperature detector.
2. When load changes on continuous processes are both small and infrequent, and control point is rarely changed.
3. On batch process where operation is usually at the same temperature, and rapid recovery from upsets after loading is not important.
4. When furnace-pressure or fuel-air ratio are controlled, or the products of combustion do form a protective atmosphere for the work.

There's an L&N control

POSITION-ADJUSTING-TYPE CONTROL (P.A.T.)

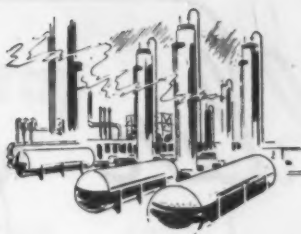
For fuel-fired furnaces

What it does:

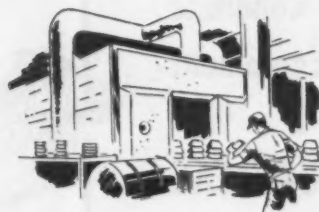
Adjusts heat input by varying valve opening according to size, duration and speed of temperature changes.

When to use it:

1. When there's a substantial time lag, before changes in heat supply or changes in load are "felt" by the temperature detector.
2. When load changes are both large and frequent and control point must be changed to suit various conditions.
3. When furnace design requires a continuously throttled flame.
4. When furnace-pressure or fuel-air ratio are controlled, or the products of combustion do form a protective atmosphere for the work.
5. Whenever overshoot is costly, hazardous or can cause damage to the product or heating equipment.

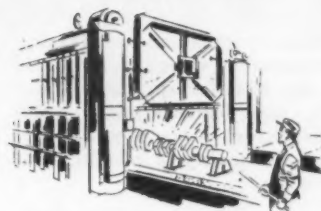


Refining
Towers



Tunnel Kilns

Forging
Furnaces



Open
Hearths

DURATION-ADJUSTING-TYPE CONTROL (D.A.T.)

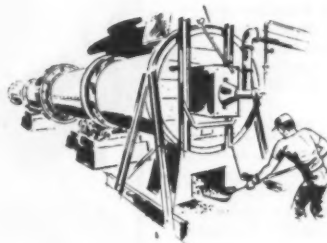
For fuel-fired or electric furnaces

What it does:

Adjusts heat input by varying length of "heat on" time according to size, duration and speed of temperature changes.

When to use it:

1. When there's a substantial time lag, before changes in heat supply or changes in load are "felt" by the temperature detector.
2. When load changes are both large and frequent, and control point must be changed to suit various conditions.
3. When furnace design requires use of "on-off" operation of heat supply.
4. When furnace-pressure or fuel-air ratio are not controlled, and the products of combustion do not form a protective atmosphere for the work.
5. Whenever overshoot is costly, hazardous or can cause damage to the product or heating equipment.



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Annealing
furnaces



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Jrl ad N-33(53)

Buehler

Offers a Complete Line of Equipment for the . . . METALLURGICAL LABORATORY

Buehler specimen preparation equipment is designed especially for the metallurgist, and is built with a high degree of precision and accuracy for the fast production of the finest quality of metallurgical specimens.

1. No. 1315 Press for the rapid moulding of specimen mounts, either bakelite or transparent plastic. Heating element can be raised and cooling blocks swung into position without releasing pressure on the mold.

2. No. 1211 Wet power grinder with $\frac{3}{4}$ " hp. ball bearing motor totally enclosed. Has two 12" wheels mounted on metal plates for coarse and medium grinding.

3. No. 1000 Cut-off machine is a heavy duty cutter for stock up to $3\frac{1}{2}$ ". Powered with a 3 hp. totally enclosed motor with cut-off wheel, $12" \times 3/32" \times 1-1/4"$.

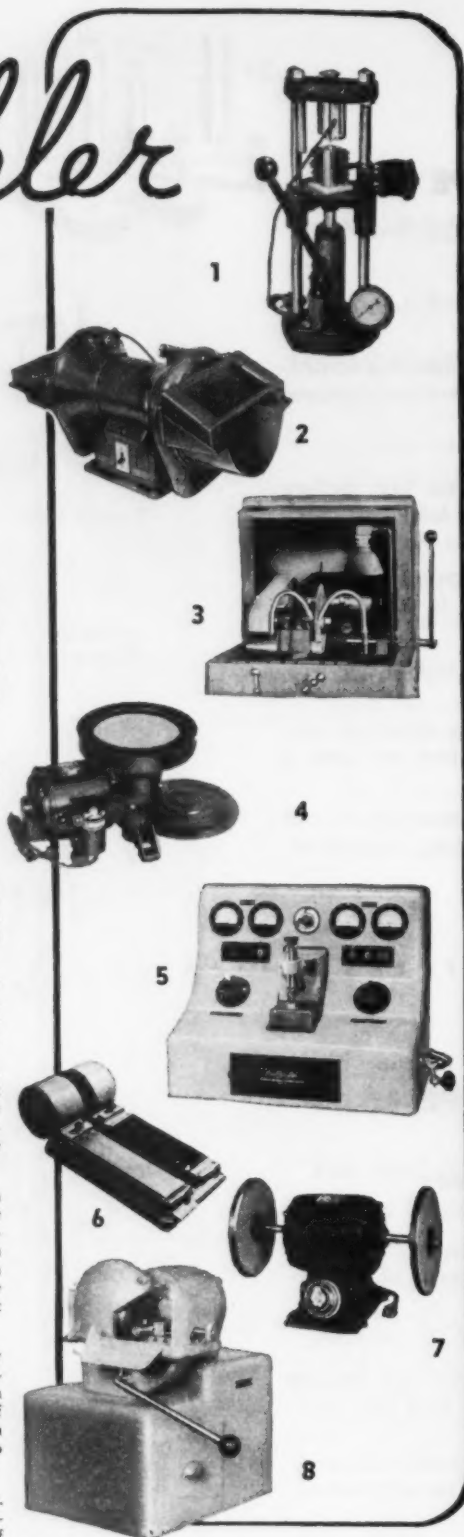
4. 1505-2AB Low Speed Polisher complete with 8" balanced bronze polishing disc. Mounted to $\frac{1}{4}$ hp. ball bearing, two speed motor, with right angle gear reduction for 161 and 246 R.P.M. spindle speeds.

5. No. 1700 New Buehler-Waisman Electro Polisher produces scratch-free specimens in a fraction of the time usually required for polishing. Speed with dependable results is obtained with both ferrous and non-ferrous samples. Simple to operate—does not require an expert technician to produce good specimens.

6. No. 1410 Hand Grinder conveniently arranged for two stage grinding with medium and fine emery paper on twin grinding surfaces. A reserve supply of 150 ft. of abrasive paper is contained in rolls and can be quickly drawn into position for use.

7. No. 1400 Emery paper disc grinder. Four grades of abrasive paper are provided for grinding on the four sides of discs, 8" in diameter. Motor $1/3$ hp. with two speeds, 575 and 1150 R.P.M.

8. No. 1015 Cut-off machine for table mounting with separate unit recirculating cooling system No. 1016. Motor 1 hp. with capacity for cutting 1" stock.



The Buehler Line of Specimen Preparation Equipment includes . . . Cut-off Machines • Specimen Mount Presses • Power Grinders • Emery Paper Grinders • Hand Grinders • Belt Surfactors • Mechanical and Electro Polishers • Polishing Cloths • Polishing Abrasives.

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—Automatic Control—

Continued

weigh the benefits which will accrue. Complete automation stands as a dream for a few industrial giants in the metalworking industry. But APC can be applied today in your plant.

What Will It Cost?

Tying APC into your plant requires a careful evaluation of cost in relation to gain. The wide diversity of units which can be used for APC is evident by the extensive material prepared by IRON AGE editors for your use, pages 273 to 304.

Almost any operation now performed on a continuous basis can be handled economically by APC. Many installations will be required for reasons of safety or convenience. Only the limits of engineering ingenuity restrict the application of APC.

Flow Is Important

One factor should not be overlooked in considering applications of APC to your plant operations. Steady flow of parts is a big factor in making APC more attractive costwise.

The fewer the number of parts, the higher the relative cost of putting APC to work. Cut down parts flow far enough and the cost of installing APC approaches the cost of control without APC.

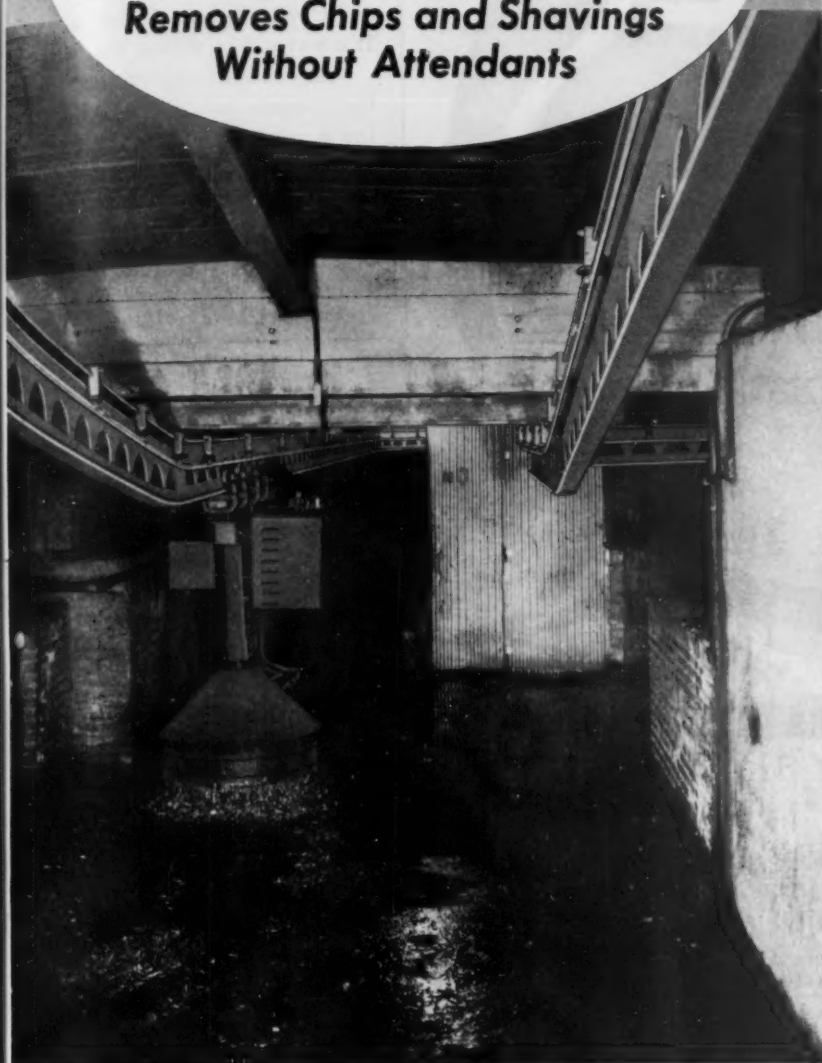


TWENTY-TWO STATION machine drills and taps holes in tractor cylinder block.

Turn to Page 318

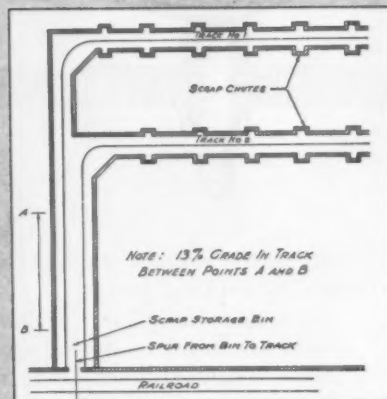
Automatic Steel Scrap Disposal System

Removes Chips and Shavings Without Attendants



View of tracks near beginning of tunnels. Carrier is shown approaching track incline on way to bin with a load.

A load of scrap about to be dropped in bin. Carrier immediately reverses after unloading and starts another trip.



ONE carload of metal chips and shavings is picked up and moved daily with an automatic Cleveland Tramrail magnet-carrying system that operates unattended in two parallel tunnels under metal-working machines.

Each tunnel has its own Tramrail track on which a

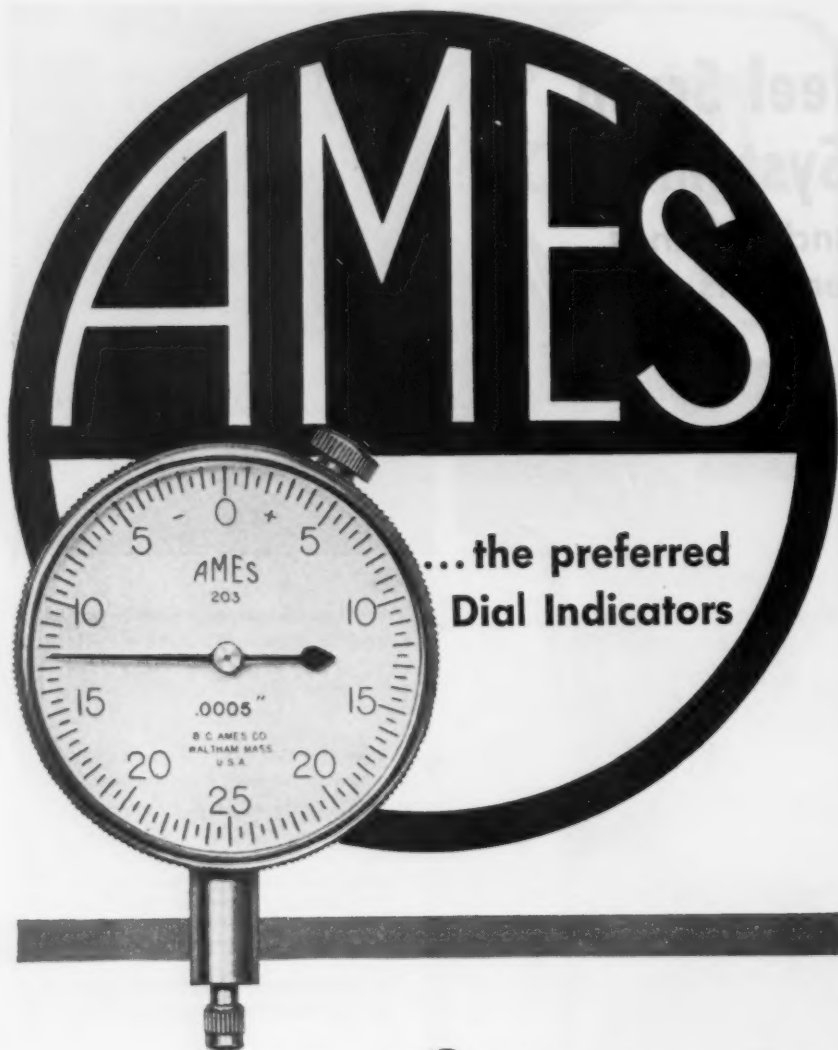
magnet carrier travels back and forth, picking up scrap that comes down from the machines on floor above. The scrap is conveyed to a bin next to a railroad siding. The system was put into operation in 1942 and has proven an extremely efficient and low-cost method for ferrous scrap disposal.



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THE CLEVELAND CRANE & ENGINEERING CO.
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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT



...the preferred
Dial Indicators

One of America's largest and most famous mass-producers recently chose Ames as preferred source of supply for indicator gauges.

The reasons behind this decision are the very reasons why *you* should standardize on Ames dial indicators and dial gauges:—the Ames "Hundred Series" indicators available in four sizes, fit every measuring requirement; they are *accurate, sensitive, low in friction, yet are rugged and tough*—give *more on-the-job time*. All Ames products embody latest design and highest-quality materials; they are manufactured by methods and machines that are *exclusive* with B. C. Ames Co.



Ames
Dial Depth Gauge
No. 11C

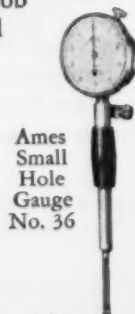


Ames
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Automatic Control

Continued

Watch Machine Design

Future wide use of APC will probably be reflected in machine design. More machines are being built with integral control units. It's a trend to watch for.

Many manufacturers of machine tools have anticipated the growing acceptance of APC. When you plan the purchase of new machine tool equipment, early overall planning with APC in mind will help you get the most from the power and speed which are also being built into today's machine tools.

Best Part Design

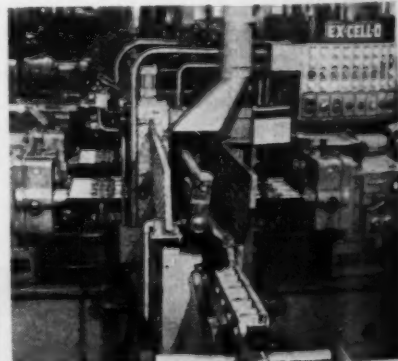
Automation engineers are beginning to find there is a "favorable" part design. Some parts can be handled more easily in materials handling equipment.

Since the widespread use of APC will involve use of materials handling equipment for fast flow into and out of machines, some parts may have a preferred design where high speed operations are involved. Closer coordination between production and design departments will be a must.

Preventive Maintenance

As with automation, extended use of APC will mean more emphasis on preventive maintenance. While the problem is not as severe as with the automatic factory, there will be an increased demand for maintenance skills capable of servicing vital APC units.

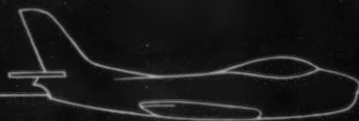
Plants will use more electricians, more specialized and highly skilled electronics men, men who



DRILLING AND BORING operations on tractor cylinder head are done on this machine.

Turn to Page 320

Prominent in the Jet Engine Program



1.0003

1.0000



"PACKAGED PRECISION"

NEEDS NO WIRES,
HOSE, ELECTRONIC
GEAR OR
HEAVY BASE

COMTOR PLUG

FOR GAGING HIGH-PRECISION HOLES

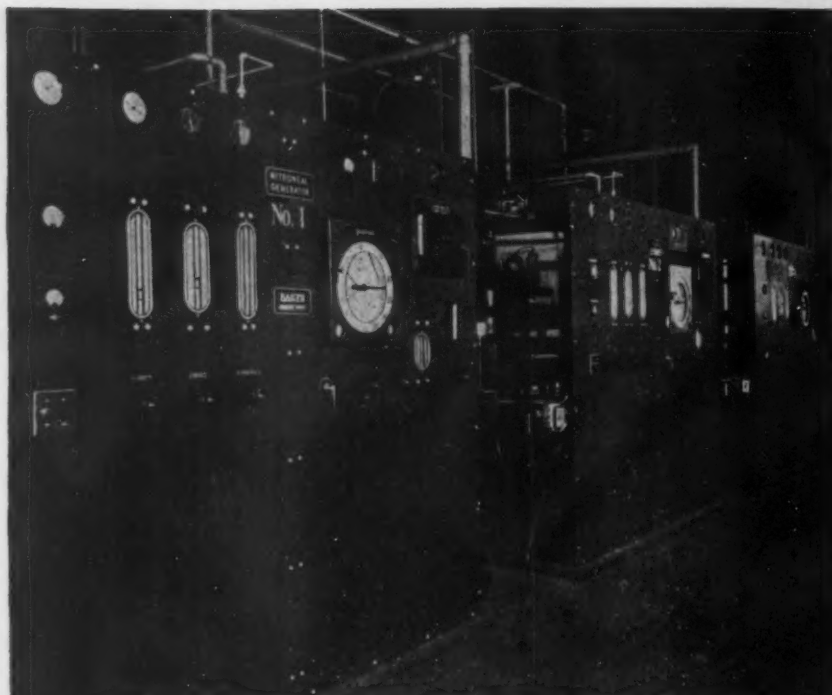
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... Produces pure nitrogen with a controllable hydrogen content that can be varied at will and maintained at any percentage from .25% to 25% to best suit

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Used for bright annealing, heat treating, and furnace brazing of stainless steel, low and high carbon steels and non-ferrous metals.

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Automatic Control

Continued

understand hydraulic and pneumatic units. Keeping the operation in order so that downtime can be avoided will have a new meaning. Downtime will become increasingly expensive and must be avoided.

How About Tomorrow?

APC is in its infancy. The meteoric growth of the controls industry is in part a reflection of the insistent demand for more adequate sensing units and vastly improved controlling units.

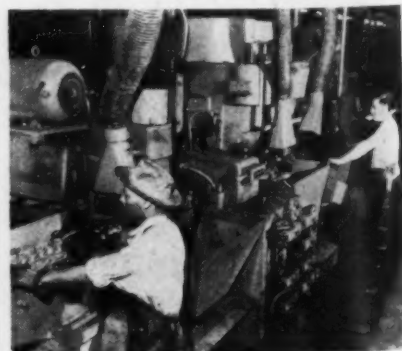
The instruments industry has an extensive research program on basic instrument development. The need for research and development in basic instrumentation is also highlighted by work of the Office of Basic Instrumentation set up by the National Bureau of Standards in 1950.

Aim of the Bureau is to coordinate a wide range of instrument research activities. It will use Bureau facilities to develop new techniques of measurement and control for science and industry.

Market Possibilities

Rapid acceptance of Automatic Process Control by industry, as reflected in the wide range of applications described in the section on APC in this issue, pages 273 to 304, indicates a healthy market for makers of this type of equipment.

Further proof of market potential in the APC field is the meteoric growth of new companies. New types of measuring and control equipment such as the beta gages have found wide acceptance. Their acceptance merely points up an evident industry need.



MILLING top, bottom and manifold face of cylinder head on transfer-type mill.

THE IRON AGE SUMMARY...

- ▶ Auto steel delivery sags, blame inventories
- ▶ Scrap price trail seems to touch the bottom
- ▶ European steel mills compete on East Coast

Detroit automakers' determination to hold steel stockpiles to manageable levels has brought a slump in auto steel deliveries.

Automotive inventories run as high as 90 working days for some, as low as 30 days for Big Three producers still maintaining hot output. There has been a rush to cancel October, November, and even December orders as steel inventories reared up.

Seasonal auto cutbacks and the General Motors' transmission plant fire came almost simultaneously with a considerable loosening of steel supply. Operating for many months on a hand-to-mouth inventory basis, some automakers found steel stocks suddenly spiralling upwards. While production was reduced, steel supply grew in vitality. Duplicate orders, issued as insurance against shortage, stood out like sore thumbs.

Still maintaining high production, Big Three automakers are not so afflicted with topheavy inventories. Consolation to the steel industry is that the largest producers have reduced shipments the least. For the others some semblance of buying order seems assured late this year or early in '54.

The scrap iron and steel market seemed to have touched the bottom of a long downward trail. Significant was the fact that this week THE IRON AGE Steel Scrap Composite dropped only 17¢ to \$31.33. Although this is the tenth successive week of decline, tapering off of the current dip showed up as a glint of hope in the market.

Some firming up is possible in scuttled scrap prices—if steel mills come out from behind heavy stockpiles and begin substantial purchases. Dearth of orders in past months has hurt the scrap industry more than the downfall of prices.

Competition from steel-glutted Europe is nipping American steelmakers on the East Coast. Europeans are proving their need for dollars and markets by underselling American steel plants on carbon rods, nails, barbed wire, and even on seamless tubing.

Shipping to the U. S. some of the products around which stiffest competition has already developed here, European mills are reportedly selling nails for up to \$2 per ton under the American price, barbed wire up to \$1.75 per bundle under U. S. prices.

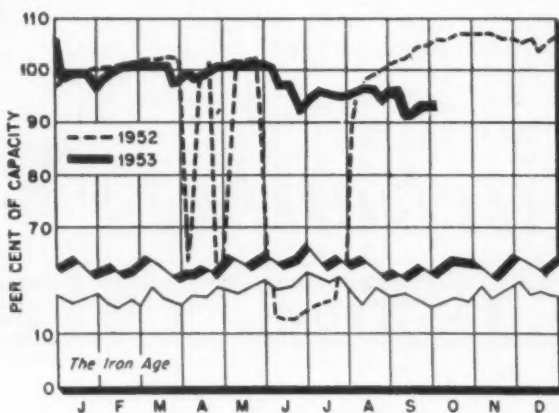
Meanwhile, spectres of more substantial competition for the steel industry converged from another two directions. In a bandwagon movement the bulk of the steel industry made the already known fact of rising competition official by announcing sales policies of selective freight absorption. On another front, reports to IRON AGE indicated price cutting on stainless steels, paring of pig iron prices.

Steel supply may be easing, competition growing more acute—but warehouses are showing a steel-ribbed optimism. They predict total 1953 business will surpass 1952 by about 10 to 15 pct. Improved steel supply means more steel in the storage racks to sell, healthier inventories to assure quick delivery.

Steel Operating Rates

	Week of Oct. 4	Week of Sept. 27		Week of Oct. 4	Week of Sept. 27
Pittsburgh	98.0	100.0*	Detroit	98.0	93.0*
Chicago	95.5	99.5	Birmingham	96.5	96.5
Philadelphia	96.0	96.0	Wheeling	98.0	98.0
Valley	95.0	95.0*	S. Ohio River	82.5	82.5
West	99.0	97.0*	St. Louis	103.0	96.0
Cleveland	95.5	93.5*	East	90.0	86.0*
Buffalo	106.5	106.5	AGGREGATE	95.0	95.0

Beginning Jan. 1, 1953, operations are based on annual capacity of 117,522,470 net tons.
* Revised.



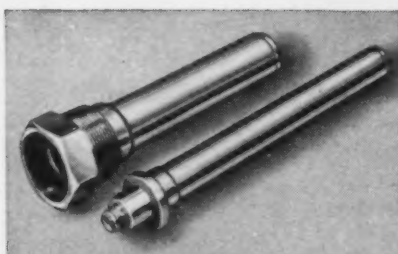
October 8, 1953

Here's why it pays to insist upon *Carpenter* Stainless Tubing



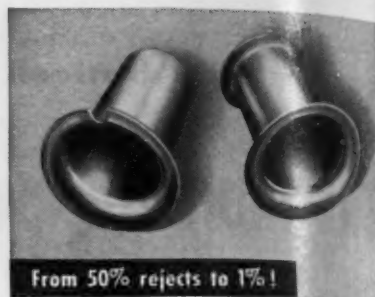
Easier fabrication and a better product!

After testing tube from several sources, the manufacturer of these condensers found that Carpenter's quality control at the mill gave him easier bending and a better finished job.



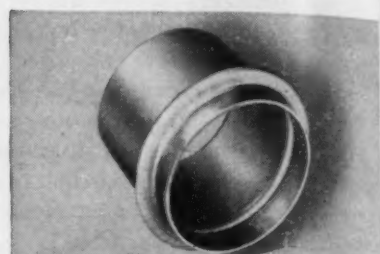
15% to 20% saving!

These thermostat sleeves and bulbs require precision fabrication. After changing to Carpenter Stainless Tubing they gained a 15% to 20% saving in the cost of producing each unit.



From 50% rejects to 1%!

For this tough flaring job two brands of Stainless Tubing were tried with 50% rejects. Then they switched to Carpenter and rejects dropped to less than 1%.



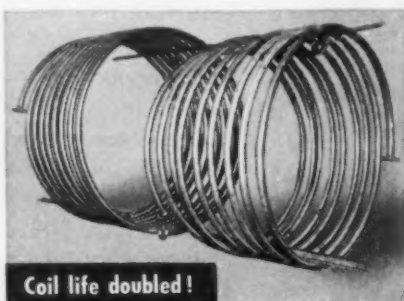
10c saved per piece!

The fabricator of this refinery equipment needed a ductile Stainless Tubing that would "take" the severe fabrication. Since changing to Carpenter, he figures a saving of about 10c apiece.



40% rejects before—now, 1%!

Before changing to Carpenter, fabricating rejects ran 40%. Now the collapsible handle of this uranium detector is produced—at a reject rate of only 1%.



Coil life doubled!

In a brick-lined hydrolysis tank, lead coils had been used for years. Then they found that coil life could be doubled with Carpenter Stainless No. 20.



From 20% rejects to none!

Rejects because of breakage amounted to 20% of each run. Changing to Carpenter Stainless Tubing, rejects were completely eliminated.

These are not unusual or "special" jobs . . . just a few of the many hundred examples in our files of how products have been improved, fabricating problems simplified, and production costs cut by switching to Carpenter Stainless Tubing. They all point up this one significant fact: *All stainless tubing is not the same.*

Whenever any kind of equipment or fabricated part calls for something "extra" . . . in working properties, corrosion resistance, tolerances, finish . . . users of stain-

less tubing and pipe in a wide variety of industries have learned from experience that they can always count on Carpenter quality and Carpenter technical assistance to meet the challenge.

Prove to *your* own satisfaction that there really is a difference in stainless tubing. Specify Carpenter on your next order. You'll discover, as have hundreds of other users, that there is no "or equal" for Carpenter quality and all-around service satisfaction.

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STAINLESS TUBING & PIPE



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Markets at a Glance

Nickel Now Free . . . Decontrol of nickel for civilian use, approved by Defense Mobilizer Flemming early this week, will be followed by a program of government nickel buying to meet stockpile needs. Mr. Flemming asserted that supply of the metal may not be sufficient to satisfy civilian demands for many months. He added, however, that "it is not illogical" to believe dropping of end-use controls will raise the amount of nickel available to the U. S. Mr. Flemming has asked Commerce Secretary Weeks to authorize action to take these controls off at the soonest possible date.

Simplify Wheel Pricing . . . United States Rubber Co. has published a new simplified net pricing schedule for grinding wheels. The new schedule allows direct computation of net prices for most items including straight side, cup and cone wheels.

Weirton Mine Sold . . . Pittsburgh Consolidation Coal Co. has bought the Weirton Mine of Weirton Steel Co., near Morgantown, W. Va. Price was only \$1.5 million despite fact that it cost between \$8 to \$10 million to develop and equip 4 years ago. Weirton closed the mine June 27 due to bad roof conditions, and Pitt-Consol does not plan to reopen it.

More Aluminum Available . . . More than 50,500 tons of primary aluminum will be made available to independent fabricators for the fourth quarter. All has been contracted for. This is approximately 40 pct more than integrated producers are required to set aside for the independents under agreements with the government. It is also 5500 tons more than the amount available during the third quarter. General Services Administration estimates that total production of primary metal during fourth quarter will amount to about 325,000 tons.

Grant Tax Writeoff . . . Office of Defense Mobilization has issued a certificate of necessity for fast tax writeoff to Great Lakes Steel Corp. for expansion of steel sheet, plate and strip facilities. Cost of the program is estimated at \$10,834,170, with 50 pct allowed for accelerated amortization.

Pour More Steel . . . Canadian production of steel ingots and castings for July 1953 amounted to 323,385 net tons for a daily average of 82.3 pct of rated capacity. This compares with 352,463 net tons or 92.7 pct for June.

End Openhearth Walkout . . . Openhearth production at Republic Steel's Cleveland Works was back to normal early this week following an unauthorized 1-day walkout by about 600 workers. Trouble started after a single furnace helper was dismissed for negligence. Union officials prevailed upon the men to honor their contract after production had been halted for 24 hours. Republic lost about 7000 tons of steel while 19 furnaces were down.

Layoffs in Alabama . . . Despite predictions of continued good business the rest of the year, small layoffs in primary and fabricated metals plants are being made in Birmingham, Gadsden and Anniston, Ala., and some foundries are on 4-day schedules. Reduction of forces in individual plants is small but there is considerable shifting of workers from manufacture of items that are not moving to those more in demand. Management of the plants say they expect the layoffs to be only temporary. There is still a shortage in some skills, however, such as tool and die makers and machinists.

Offset Wage Rises . . . Increased construction efficiency has largely offset building trade wage increases of about 5 pct in the last 12 months, commented George A. Bryant, president of The Austin Co., in reporting a 2 point rise to 189 in the Austin quarterly index of industrial building costs (1926 = 100). Improved design and more efficient operation has held cost rises to less than half the amount of increase in wages and materials prices, he pointed out.

Complete Expansion . . . National Malleable & Steel Castings Co. of Cleveland is nearing completion of a \$12 million improvement and expansion program.

Prices At A Glance

(cents per lb unless otherwise noted)

Composite Prices	This Week	Last Week	Month Ago	Year Ago
Finished Steel,				
base	4.634	4.634	4.634	4.376
Pig Iron (gross ton) .	\$56.59	\$56.59	\$56.76	\$55.26
Scrap, No. 1 hvy.				
(gross ton)	\$31.33	\$31.50	\$38.67	\$42.00
Nonferrous Metals				
Aluminum, ingot . . .	21.50	21.50	21.50	20.00
Copper, electrolytic .	29.50	29.50	29.50	24.50
Lead, St. Louis	13.30	13.30	13.80	15.80
Magnesium, ingot . .	27.00	27.00	27.00	24.50
Nickel, electrolytic .	63.08	63.08	63.08	59.58
Tin Straits, N. Y. . .	82.50	82.75	83.00	\$1.21%
Zinc, E. St. Louis . . .	10.00	10.00	10.50	13.50

Firm Trims Slab Zinc Output 25 Pct

American Zinc, Lead & Smelting will cut back output of slab zinc 25 pct by Nov. 1 . . . Low prices due to big imports get the blame . . . Others may follow—By R. L. Hatschek.

Last week the zinc industry heard Howard I. Young, president of American Zinc, Lead & Smelting Co., announce that his firm would trim slab zinc output by 25 pct. The move is being made in two steps, one cut effective Oct. 1 and the other effective Nov. 1. This is a cut of some 1750 to 1800 tons of Prime Western zinc monthly.

Mr. Young laid the blame on current low price levels. He pointed out that, at 10¢ per lb, the price is 48 pct below the price prevailing in late 1951 and early 1952. The low prices he blamed on heavy imports.

Some 400 workers will be laid off as a result of the production cutback.

Will Others Follow? . . . Naturally this announcement caused a flurry of speculation in the trade. Consensus was that similar cuts by other producers are extremely likely. Mine production, of course, is still dropping but the mining industry is having trouble in agreeing on the best medicine to cure their problems (See THE IRON AGE, Oct. 1, p. 138).

It didn't take long for more action to occur—Matthiessen & Hegele Zinc Co. this Monday cut slab production by 33 pct to the lowest operating level since 1938. Cheap foreign zinc once again got the blame.

MONTHLY AVERAGE PRICES

The average prices of the major non-ferrous metals in August, based on quotations appearing in THE IRON AGE were as follows:

	Cents Per Pound
Electrolytic copper, Conn. Valley..	29.500
Lake Copper, delivered	30.125
Straits tin, New York	82.313
Zinc, East St. Louis	10.180
Zinc, New York	10.682
Lead, St. Louis	13.540
Lead, New York	13.740

Meanwhile, the market continues slow. Quoted price continues at 10.00¢ per lb for Prime Western grade. And transactions continue to be made on an average price basis. Lead business is a bit better with consumers showing fair demand for October tonnages. Here, too, the quoted price continues steady while business is done on the average price basis.

No Word Yet . . . At press time there wasn't even so much as a hint of the status of negotiations between the State Dept. and the Chilean representatives on the purchase of Chile's surplus copper stocks. And the chances are strong that talks will continue for some time because of the many ramifications of the problem.

The complexity of the issues and

difficulties in liaison are the reasons. Not only are there prices and tonnages concerning existing stocks to be discussed—there are the same aspects of current production. The question of Iron Curtain sales must be considered.

Slow Going . . . Manner in which the talks are being carried out is reminiscent of the recent truce talks at Panmunjom. Relatively short meetings are held, then the conferees must consider the various proposals and counter-proposals. The Chilean representatives must contact their government and the companies producing copper in Chile. Then back to the negotiations.

Postpone Strike . . . Another problem facing Chile is labor trouble in the copper mines. The government has been successful in persuading the workers to postpone until Oct. 12 a strike already called for Anaconda Copper Mining Co.'s Potrerillos mine. This mine's normal production is about 4000 tons of copper monthly.

The Chilean government has also requested miners at Anaconda's 15,000-ton-per-month Chuquicamata mine to modify their demands. A strike can start there any time before Oct. 17.

Meanwhile, in Canada, talks aimed at ending the Noranda copper strike were called off late last week and the strike continues.

Warehousemen Meet . . . Third annual meeting of the National Assn. of Aluminum Distributors was held last week in Colorado Springs. Central theme of several of the addresses was cooperation between producer and distributor. This relatively young phase of the warehouse industry has already grown to the point where it handles some 14 pct of aluminum mill products output.

Representatives of the aluminum producers stressed growth in the overall uses of the metal, citing thousands of civilian and military applications as a base for an optimistic future.

NONFERROUS METAL PRICES

(Cents per lb except as noted)

	Sept. 30	Oct. 1	Oct. 2	Oct. 3	Oct. 5	Oct. 6
Copper, electro, Conn.	29.00—	29.00—	29.00—	29.00—	29.00—	29.00—
	30.00	30.00	30.00	30.00	30.00	30.00
Copper, Lake delivered	30.125	30.125	30.125	30.125	30.125	30.125
Tin, Straits, New York	82.75	82.75	82.25	82.50	82.50*
Zinc, East St. Louis	10.00	10.00	10.00	10.00	10.00	10.00
Lead, St. Louis	13.30	13.30	13.30	13.30	13.30	13.30

Note: Quotations are going prices

*Tentative

- **NON-FERROUS METALS**
- **ORES AND MINERALS**
- **METALLIC RESIDUES**
- **METAL SCRAP**
- **FERRO ALLOYS**
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Iron and Steel Scrap Markets

Have Prices Reached Turning Point?

Trade feels any sizeable new orders must be placed at higher prices . . . Claim present levels hurt collections . . . Rate of decline slows, as some prices rise . . . Optimism returning.

Nobody could say the storm had blown itself out just yet. But faint glimmers on the horizon seemed to promise smoother water for the scrap trade. With THE IRON AGE Steel Scrap Composite at \$31.33, only 17¢ under last week's figure at \$31.50, the worst of the gale seemed over.

Some prices declined a bit further, but most stayed about the same, while some actually rose a bit. Movement was still very low, with most mills staying well out of the market. But continued high ingot rates heartened scrap men, some of whom believe winter orders must be placed within the next month.

The trade is generally agreed that no matter when new orders come, they will have to be placed at higher prices. Present depressed price levels are drying up the flow of scrap into dealers' yards. Most scrap men feel the bottom has been just about reached as far as prices are concerned.

But nobody expects scrap prices to bounce back to former boom levels. Best hope is for a rather gentle rise, culminating in fairly heavy winter orders by mill consumers. And marginal sources developed during the Korean emergency will probably stay dormant for some time to come.

Pittsburgh—Continued high ingot rates injected a note of hope into the scrap market here but prices registered further declines. On appraisal, No. 1 heavy melting steel dropped \$1 per ton. Low phos and railroad grades also were weaker. Blast furnace scrap is tentatively unchanged. Consumers are out of the market. Mills have scheduled high operating rates for the first full week of fourth quarter and one independent consumer may enter the market soon.

Chicago—Scrap here continued at a slow pace, but there were evidences that new hope was springing. A few orders that didn't look right pricewise were actually being turned down, and the pessimism of a week ago was less in evidence. For the first time in several weeks, a few sources were willing to lay down turnings. While they admitted that most new sales were at last week's prices and even lower in a few instances, there was a growing feeling that the dry-up of scrap was now fairly complete, that anybody who wanted a tonnage would have to offer a slightly more tempting price. Railroad grades continued to look bad at the consumer level, though the roads had been getting fancy prices.

Philadelphia—Buying by some of the smaller mills in this district seems to have stabilized the market at least for the time being. Steelmaking scrap actually edged up \$1 on these purchases. Chemical borings and railroad scrap are quoted lower this week. Foundry grades remained at older levels.

New York—With scrap virtually at a standstill here, a good part of the trade had to be contacted at Yankee Stadium early this week. Steelmaking grades were off generally another dollar but prices were largely nominal as only scattered carloads moved. Trade feeling is that new orders will have to be filled at higher prices. Big question is when mills will re-enter the market. Some turnings and cast grades were reported moving at unchanged prices.

Detroit—Some substantial buying by a major consumer stabilized this market somewhat. It actually lifted the price of No. 2 bundles slightly, but couldn't keep No. 1 bundles from continuing their downward trend. Most of the trade thinks the bottom may be reached, but doesn't look for any significant rebounding. Cast dropped across the board.

Cleveland—For the first time in weeks there was a glimmer of hope in this area as prices remained unchanged. Some dealers who report collections drying up say they will pay more for scrap in the near future. Majority of the scrap men here and in the Valley think prices have hit bottom. Many expect a gradual strengthening which could be climaxed by movement of winter tonnages next month.

Birmingham—With major district steel mills out of the market, scrap was dull this week. There was some movement of cast early in the week, indicating an improvement over the past few weeks, and some electric furnace scrap was moving. Prices on some items were cut still further by buyers.

St. Louis—Seven railroads issued lists offering a total of 12,800 tons of scrap, most of which would normally go to this market. Lists were to be closed the latter part of last week. Results of the sale will set the price pattern for this district. Issuance of these lists had the effect of holding down further buying by all factors, at press time, and there were only minor price changes.

Cincinnati—There was a negligible amount of local buying here this week but market generally is as slow as it can get. Dealers and brokers hope steelmaking operations will continue at fairly high levels. If they do, November buying is a distinct possibility. Cast market is still very nominal with buying prices ranging from \$30 to \$34.

Boston—Steelmaking grades dropped again—anywhere up to \$4 per ton. Electric furnace scrap and No. 1 heavy melting are quoted at the same level since any sales of the former are as the latter.

Buffalo—Additional gloom settled over this market and prices slumped \$2 a ton more as a leading mill consumer indicated it would not place new orders this month. The same mill continued its embargo on shipments. A second mill lifted its embargo but on a disappointing restricted basis. Huge supplies are accumulating in dealers' yards.



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Qu.	H.P.	Make	Type	Volts	RPM
1	2300	G.E.	MCF	600	400/500
1	2000	Whae.	Mill	600	230/460
1	940	Whae.	QM	250	140/170
1	900	Whae.		250	450/550
1	825	Whae.		250	95/190
1	800	Al. Ch.		250	400/800
1	500	Whae.	CC-216	600	300/900
2	450	Whae.		550	415
1	400	G.E.	MCF	550	200/1050
2	300	Whae.	CB-5094	250	575/1150
1	300/300	G.E.	MPC	230	360/920
1	200	Rel.	1970T	230	720
1	200	Whae.	CB-5113	250	400/800
1	150	G.E.		600	250/750
1	150	Cr. Wh.	65H	230	1150
2	150	Cr. Wh.	83H-TEFC	230	960
1	150	Whae.	K-5	230	900/1800
1	150	Whae.	SK-151B	230	360/950
1	80/120	G.E.	MCF	230	250/1000
2	100	Whae.	SK-181	230	450/1000
1	100	G.E.	CDP-115	230	1750

MILL & CRANE

1	50	G.E.	CO-1810	230	725
1	30	Whae.	K-5	230	975
4	15	Whae.	K-5	230	630
2	10	C.W.	SCM-AH	230	1150
1	10	G.E.	MD-104	230	400/800
2	6.25	Whae.	K-3	230	680
4	3	C.W.	SCM-PF	230	1750
2	3	Whae.	HK-2	230	835

A.C. MOTORS

3 phase—60 cycle

Qu.	H.P.	Make	Type	Volts	Speed
1	1500	G.E.	MT-485	2300	260
1	1500	ABB		2300	720
1	1200	G.E.	MT	2300	275
1	1000	A.C.	Mill	2300	240
1	500	Whae.	CW	550	350
1	500	G.E.	I-M	2300	900
1	400	Whae.	CW	440	514
1	400	Whae.	CW-1218	2200	435
1	350	G.E.	MT-442Y	2200/4000	253
2	300	G.E.	MT-565Y	2300	900
1	250	G.E.	MT-424-Y	4000	257
1	250	G.E.	MT-5598	2200	1800
1	250	Al. Ch.		550	600
1	200	Cr. Wh.	26QB	440	505
1	200	G.E.	IM-16	440	600
1	200	G.E.	IM	440	435
1	200	G.E.	MTP	440	1170
1	150 (unused)	Whae.		2300	435
1	150	G.E.	IM-16	440	600
2	125	A.C.		440	885
1	125	Al. Ch.		440	720
4	125	G.E.	MT-568Y	440/2200	435
1	100	G.E.	IM	440	600
2	100	A.C.	ANY	440	695
1	100	G.E.	IM-16	2200	435
1	100	Whae.	CW-868A	440	700

SQUIRREL CAGE

2	600	G.E.	FT-550BY	440	3570
2	450	Whae.	CR-1450	2300/4150	354
1	200	G.E.	IK-17	440	580
2	200	G.E.	KT-557	440	1800
1	150	Whae.	CR-608H	440	880
1	150	Whae.	CS	440	580
1	150/75	G.E.	IK	440	900/450
2	125	Al. Ch.	ABW	2200	1750
1	125	Whae.	MR	440	485

SYNCHRONOUS

2	2500	G.E.	TS	2200	257
2	2100	G.E.	ATI	2300	560
2	1750	G.E.	ATI	2300	3000
2	3000	Whae.		2300	120
2	725	G.E.	ATI	2300/12000	600
1	450	Whae.		2200	450
2	450	G.E.	TS	2200	156

M-G Sets—3 Ph. 60 Cy

Qu.	K.W.	Make	RPM	D.C. Volts	A.C. Volts
2	3000/2400	G.E.	450	250/300	2300/4600
2	1750/2100	G.E.	514	250/300	2300/4600
1	3000	G.E.	500	250	11000
2	3000	G.E.	514	600	6000/13200
2	1500	G.E.	514	250	6000/13200
1	1500	G.E.	720	600	6000/13200
1	1500	G.E.	600	600	4100
1	1000	C.W.	514	30/115	4000/13000
1	1000	Whae.	900	600	4160
1	1000	G.E.	900	300	6000
1	1000 (8U)	G.E.	900	350	2200
1	750	Whae.	900	275	4160
1	750	C.W.	514	30/115	2300
1	600	G.E.	720	250	440/2300
1	500	G.E.	720	125	2300
1	500	Whae.	900	125/250	440
1	500	Whae.	1200	125/250	2300
1	400 (8U)	Cr. Wh.	1200	275	2300
1	150	Whae.	1200	275	2300
1	140 (8U)	Cr. Wh.	600	125/250	440/2300
1	100	G.E.	1300	250	2300/4000
1	100	G.E.	1170	125	220/440

FREQUENCY CHANGER SETS

Qu.	KW	Make	Freq.	Volts
1	13500	Whae.	25/60	13200/13200
1	3000	G.E.	25/60	2300/2300/4000
2	2500	G.E.	25/62.5	2300/2200
1	1000	G.E.	25/56.3	4000/1200
1	500	Al. Ch.	25/60	11000/7500

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The Clearing House

NEWS OF USED AND REBUILT MACHINERY

Leasing Fades . . . Late last week, it appeared that used machinery dealers might be able to forget their concern over possible government leasing of machine tools for civilian production.

Informed sources say Office of Defense Mobilization is opposed to such plans. Exceptions might be made, however, in cases where use of government-owned tools for non-defense purposes would be clearly in line with national interests.

Army Plan . . . It seemed possible that Army Ordnance Corps might work out separate agreements with companies already using Army-owned tools. Equipment that can be employed only in production of military items, if not needed, would be stored near users' plants so that they could be put back in production on short notice.

However, Army-owned tools that can be used to turn out civilian as well as military items may be left with present users, unless an overriding policy is put through to prevent this.

Feel The Pinch . . . Used machinery dealers in Cleveland, Cincinnati and other areas say they are still feeling the pinch of high prices, buyer resistance and general scarcity of good late-model tools.

Those who feel the urge to buy up-to-date tools insist asking prices are entirely too high. One Cleveland dealer told THE IRON AGE that a plant in his area asked \$8000 for a turret lathe which he was listing at \$7250. Similar reports were heard from other used equipment firms seeking radial drills, multiple-spindle automatics, surface grinders and other machinery.

Market Still Off . . . Demand from small machine shops in the Cleveland area has perked up interest in general-purpose tools,

but nevertheless the market is not healthy. The familiar complaint about scarcity of late models is still being voiced.

Phenomenal auction bidding seems to have dropped off considerably. Many dealers are still willing to go bargain hunting if an original owner goes out of business or retrenches, but they are staying away from machinery owned by auctioneers.

Sales Off 50 Pct . . . Although there have been some cuts in dealer prices, many industry sources believe the market is still pegged too high. Some firms report sales off 40 to 50 pct and say the only way to offset this is to lower the price scale.

Demand from small civilian manufacturers still hasn't materialized to any important degree. Many dealers trace this condition to buyer resistance to high prices.

Start Statistics Survey . . . New York chapter of the Machinery Dealers National Assn. held its first fall meeting last week. It was attended by most of the members MDNA Board of Directors.

Doug Williams, Williams Machinery Co., Newark, N. J., head of the New York chapter and chairman of the MDNA Statistical Committee, reported that the program to obtain information on sales of used machinery had gotten off to a fast start.

Respond Quickly . . . Less than one week after the request for sales information had been sent out around 60 dealers had mailed their reports to the accounting firm of Ernst & Ernst, Munsey Bldg., Washington, D. C., which is responsible for compiling the figures.

The New York chapter which first attempted a statistical program on a trial basis has indicated that it may resume its own program in addition to taking part in the national survey.